

# The American Midland Naturalist

Devoted to Natural History, Primarily  
that of the Prairie States

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# The American Midland Naturalist

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## FERN NOTES II

### Ferns in the Herbarium of Parke, Davis & Co.

OLIVER ATKINS FARWELL.

In rearranging the ferns in the herbarium of Parke, Davis and Co., it becomes necessary to make a number of new combinations in order that the plants may be put away under correct names according to the International Rules. Nomenclature for ferns begins in 1753, the same as for the higher plants.

In bringing fern nomenclature under the International Rules, a number of well known genera will necessarily be laid aside and disappear for older names not so well known. Many of these genera have been divided and subdivided until the only things left of the original genera are the names and these have been transferred to species of other genera not originally included in them. Under these conditions it is almost impossible to apply the International Rules other than arbitrarily. The older botanists of a century or more ago did not trouble to designate types; this being so, about the only way Article 45 can be applied will tend to produce the same results as the old rule of residues, the generic name remaining with the residue (the larger part) until the last subdivision, not a very satisfactory method. The only other way is to arbitrarily designate a type species; this I shall do and

Read at the 34th Annual Meeting of the Michigan Academy of Science, Arts and Letters, March 16, 1929.

will take such type from those species which really represent a new genus. The new genus must be typified by the new generic element; those species in a new genus which really belong to some genus or genera of earlier date and publication are automatically restored to their respective genera and are thus placed beyond consideration. Some attempt has been made to conserve fern generic names in Botanical Congresses but without success. The Botanical Congress has left them open to the application of the Rules.

The American Code, in the absence of a designated type, provides that the first species named shall be the generic type; but this is highly arbitrarily, unreasonable and illogical in the extreme in that the first named species rarely if ever would represent the new generic element within the genus or the genus as meant and understood by the original author. I give each author the credit or benefit of the supposition that he knew he had a new genus when he published it and that it is our duty to ascertain what part of it was really new and make that part the type. This is the only logical manner of handling the subject. It will produce less changes and less synonyms than the American Code method and will not ruthlessly nullify the life work of the older botanists whose labors are worthy of their hire.

*Filicula* Seguiet. According to Woyнар in Hedwigia (1915) Vol. 56 p. 381, Seguiet published this genus in 1754 (Pl. Veron, Suppl. 55) and he determines it as *Cystopteris* Bernh. Under the Intern. Rules, it being the oldest name applicable, it must supplant *Cystopteris* Bernh., and *Filix* Adanson and of some American authors (see pp. 251 and 252).

*Struthiopteris* Willd. (1809) Mag. Ges. Nat. Fr. Berlin III 160. *Pteretis* Raf. Amer. Month. Mag. (1818) II 268. *Matteuccia* Todaro, Syn. Pl. Acot. Vasc. Sicilia (1866) 30. The use of *Struthiopteris* by Weiss in 1770 (which is *Lonchitis-aspera* Hill, 1756) does no invalidate, under the International Rules, its use by Willd. (1809) for the Ostrich Fern. *Struthiopteris* Bernh. (1801) is a different name and also a pure synonym of *Osmunda* Linn.. *Struthiopteris Filicastrum*

All. (1785) is the proper name for the Old World Ostrich Fern for those who do not approve of duplicate names. (See p. 252). At the same time and place, Woynar refers *Filix* Ludw. (1757) to *Pteridium*. See p. 290). I am under obligations to Mr. C. A. Weatherby for a transcript of Ludwig's publication as it refers to ferns and I am at a loss to understand how anyone can identify *Filix* Ludw. It may be called *Woodsia* or *Athyrium* just as well as *Cystopteris* or *Pteridium*. There is nothing in the publication that will tie it down to any known species of fern. One guess is as good as another. It is in fact, a real nomen nudum. The publication is as follows:

"Epiphyllaspermae folio (b) magis composito (2) pinnato, pinnulis (?) ad nervum usque sectis-FILIX."

This is nothing more or less than a large pit into which may be dumped every known species of POLYPODIACEAE that has a frond that is two or more times pinnatifid or pinnate.

In 1915, I used *Filix* Hill, Fam. Herb. (1755) for *Dryopteris* Adans.. After further study of the subject I find that I was in error in considering *Filix* as the full generic name. I should have used *Filix-Mas*. On comparing that work with Hill's British Herbal, one can scarcely escape the conclusion that FILIX MAS and FILIX FOEMINA were used in the same sense in each work and that each was used in a generic sense. The type of the former is *Fm. vulgaris* Hill, Br. Herb. (1756) 527, t.74; (*Filix non ramosa dentata* Bauhin) which is *Polypodium Filix-mas* Linn.. (Also *Thelypteris* Schmidel; *Dryopteris* Adans.; *Nephrodium* Richard; Mx.) (see pp. 253-258); the type of the latter is *Ff. vulgaris* Hill, l. c., 528, t. 74. (*Filix ramosa major pinnulis obtusis non dentatis* Bauhin) which is *Pteris aquilina* Linn. (Also *Pteridium* Gleditsch; *Cincinnati* Gled.) (See p. 290).

*Nephrodium* Mx. Flor. Bor. Amer. (1803) 266. Michaux cites *Nephrodium* from Hort. Med. Paris. Cat.. I have not seen the publication cited; but according to Ascherson and Graebner, Syn. Mit. Fl. (1896) I 26 and C. Christensen in the

Index Filicum pages 432, 439 and 264 *Nephrodium* Richard in Marthe, Cat. Jard. Med. Paris pages 120 and 129 was published in 1801 and was a monotypic genus based on *N. Filix-mas* (*Polypodium Filix-mas* Linn.). This makes *Nephrodium* Richard a pure synonym of *Filix-mas* Hill (*Thelypteris* Schmidel; *Dryopteris* Adans.). Since Michaux cited the Paris Catalogue and at least one third (4) of his species (12) are congeneric, as usually interpreted, his genus can not be construed in any other light than as being typified by *Polypodium Filix-mas* Linn.; that is in the same sense as used in 1801 by Richard.

*Filix-mas* Hill has all the veinlets free.

*Cyclisorus* Link should be separated from *Filix-mas*. In this genus, the lower veinlets of contiguous groups are united to form costal arches. (See pp. 258, 259.)

*Aspidium* Swz., 1801. The late Dr. L. M. Underwood tried his best to relegate this generic name to the port of forgotten names, let us hope, without success. It is a good genus. Swartz listed 72 species, 58 of which are automatically removed from it to 7 genera that had already been named and described; incidentally, these 58 species, accordingly are removed from consideration when a type for *Aspidium* is to be chosen. These 7 genera are: *Filicula* Seguiet, 1754-6; *Chamaefilix* Hill, 1756-1; *Filix-mas* Hill, 1756-28; *Polystichum* Roth, 1799-16; *Athyrium* Roth, 1799-4; *Tectaria* Cav., 1799-1; *Oleandra* Cav., 1799-2. This leaves 14 species to represent the new generic element in *Aspidium* Swz.; from these 14 species the type is to be taken. They were distributed in later years amongst 8 genera of later date, thus leaving *Aspidium* Swz. without a species to its name. These genera are: *Hemitelia* R. Br., 1810-1; *Didymochlaena* Desv., 1811-1; *Nephrolepis* Schott, 1834-6; *Sagenia* Presl, 1836-2; *Cyrtomium* Presl, 1836-1; *Goniopteris* Presl, 1836-1; *Cyclosorus* Link, 1841-1; and *Cyclopeltis* J. Sm., 1846-1. Under the International Rules, it is self evident that *Aspidium* Swz. must be adopted for *Nephrolepis* Schott since it is the group

that has the largest number of species (Art. 45). As the type, I designate *Asp. cordifolium* (L.) Swz. (*Polypodium cordifolium* Linn.). (See pp. 259-262).

*Scyphofilix* Thouars, Nov. Gen. Madag. (1806) 1; Roemer, Collect. Bot. (1809) 195. I have not verified these citations but they are referred as synonyms to *Microlepidia* Presl (1836). Since *Scyphofilix* has priority of publication it must be used under the International Rules. The type species is *Polypodium Speluncae* Linn.

*Stenoloma* Fée, Gen. Fil. (1850-52) 330, t.27 bis A. 263 figs. 1-6. Fée listed 10 species. Of these, 4 are to be referred to his *Odontosoria* published in the same work on pages 325 and 326, t. 27, B f.1, and 3 to *Lindsaea*; this leaves 3 species *St. clavatum*, *St. retusum* and *St. tenuifolium* to represent the new generic element contained in *Stenoloma*. Of these I designate *St. clavatum* to be the type of the genus. A synonym is *Sphenomeris* Maxon. If these genera are to be construed as one, then *Stenoloma* Fée can not supplant *Odontosoria* Fée (Article 46) of the same date since they have been united under the latter name. They are now again considered to be two distinct genera. (See p. 263).

*Athyrium* Roth, Roem. Mag. (1799) Vol. 2, pt. 1, pp. 105 and 106. (See pages 264-266). Roth has 7 species, two of which belong to *Chamaefilix* Hill (1756); the other 5 are of *Athyrium* as currently understood, the type species being *Polypodium Filix-femina* Linn.. I have not verified the statement above but I am accepting it as correct upon the published statements of others. Roth had an *Athyrium Rhaeticum* which usually is referred to *A. Filix femina* as variety *Rhaeticum*. (See p. 294). Not having the original publication I am unable to determine the correctness or falsity of such reference. If Roth's *A. Rhaeticum* were based directly upon the Linnaean *Polypodium Rhaeticum*, it, of course, is the plant commonly known as *A. alpestre* and its reference to *A. Filix-femina* would be false; if, on the other hand, it were based upon Roth's own herbarium specimens without reference to

the Linnaean *Polypodium Rhaeticum* or Bauhin's *Filix Rhaetica tenuissime dentata*, then its reference to *A. Filix-femina* would be correct if they were of that species. The fact that he used the specific name *Rhaeticum* would seem to indicate that it was based upon Bauhin or Linnaeus and that accordingly should be referred to *A. alpestre* and should be the proper name for that species. In discussing *Polypodium Rhaeticum* Linn., Dr. Butters Rhodora (1917) XIX, 203 says: "This seems to be a clear case of a nomen confusum, which should be rejected under the international rules." Nothing is further from the fact! *Polypodium Rhaeticum* Linn. is based directly upon Bauhin's *Filix Rhaetica tenuissime dentata* which Butters himself states is *A. alpestre*!! How such a simple sequence can be confusing is beyond my comprehension; it seems to me that nothing could be less confusing than this. Any herbarium specimens in the Linnaean Herbarium under the name *P. Rhaeticum* which is not of this species (the *Filix Rhaetica* etc. of Bauhin) are not to be construed as type of *P. Rhaeticum* since Linnaeus had no types. *A. Rhaeticum* is the proper name for *A. alpestre* and should be so adopted. If *Polypodium Rhaeticum* Linn. (*Athyrium Rhaeticum* Dalla Torre) is a "nomen confusum," then about every binomial that has ever been published is such and all should be discarded and a new beginning made. Would it not be wonderful? What an open field for the species-mongers! It is better placed in *Phegopteris* than in *Athyrium*.

In the British Herbal (1756) John Hill published a number of fern genera which under the International Rules will supplant generic names of a later day. Most of them are of two separate words and can not be used under article 54, (3) since they are not hyphenated; but though article 54 prohibits their use they can be used under article 57 by writing them as one word or by supplying a hyphen and calling the result a correction of a typographic or orthographic error. In the present instance this will be done. *Phyllitis* credited to Ludwig (1757) should be credited to Hill, Brit. Herb. (1756) page 525 t. 74. (See p. 267). These genera are well described,

each has a reference to Bauhin, each is illustrated on t. 74 and the binominal type species of each is specifically named so that their proper publication has been accomplished under any and all rules and codes. \*

Hill, l. c., pp. 526 to 529 split up the Linnaean *Asplenium* into a number of genera retaining the name in its historic sense as did Ludwig a year later. This is in accordance with Article 45, Inter. Rules, which reserves the generic name for the type or origin of the genus when that is known. In this instance *Asplenium* Linn. was adopted from Tournefort to which were added *Trichomanes* Tourn. and *Lingua Cervina* Tourn.. Even though Linnaeus named no type of *Asplenium* the type naturally will be *Asplenium* Tourn., from which Linnaeus adopted the name, where it was applied to the *Ceterach officinarum* of both earlier and later botanists; this last name, therefore, is the type of the *Asplenium* (Tourn.) Linn. is in accordance with Hill's treatment of the genus. Type species is *Asplenium vulgare* Hill, l. c. 526 = *Ceterach officinarum* Bauhin = *Asplenium Ceterach* Linn.. (See p. 268).

A segregate is *Neottopteris* J. Sm. (*Thamnopteris* Presl.) of which the type is *Asplenium Nidus* Linn.. The tips of the veins are connected by a distinct intramarginal transverse vein. (Seep. 268).

Hill, l. c., split up the balance of *Asplenium* into five other genera. *Chamae Filix* p. 526, the type being *C. f. maritima* Hill = *Aspl. marinum* Linn.. *Trichomanes* p. 527, the type being *T. vulgare* Hill = *Asplenium Trichomanes* Linn.; *Acrostichum* p. 527, the type being *A. vulgare* Hill = *Acrostichum septentrionale* Linn.; *Adiantum Album* p. 528, the type being *A. a. Adiantum album* Hill = *Ruta muraria* Bauhin = *Asplenium Ruta-muraria* Linn.; *Adiantum Nigrum* p. 529, the type being

\*On page 530 of the British Herbal, t. 74, Hill establishes the genus *Lenticula* based on the Large Duckweed (*Lenticula major* Hill p. 531). This is the *Lemna polyrrhiza* Linn. and *Lenticula polyrrhiza* (L.) Lam. He also has *L. vulgaris* Hill which is *Lemna gibba* Linn. likewise illustrated on t. 74. *Lenticula* Hill therefore supersedes *Spirodelia* Schleid (1839) under the International Rules. (Art. 54, 1).



*A.n. vulgare* Hill = *Adiantum foliis longioribus pulverulentis* Bauhin = *Asplenium Adiantum-nigrum* Linn.. As said above, all are illustrated on plate 74. All these belong to what has been termed by most botanists, true *Asplenium*; the species have rhizomes and fronds of various forms, the latter with free veins, simple or branched and linear sori, single, straight, indusiate and may be united under *Chamaefilix* Hill, l. c., writing the name as one word as did many of the earlier botanists and to comply with the Intern. Rules, Article 57. I have no faith nor confidence in rules, the application of which makes liars of botanists, both modern and old. *Chamae Filix* is as good a genus name, to me, as *Chamaefilix*; and *Adiantum Album* *Adiantum album* is as good a binominal as *Adiantum-album* *Adiantum-album*. I can see no more reasonable objection to a genus name of two words than to a specific name of two words: and even though Linnaeus did not use the former, yet he used many of the latter; but alack and alas, the modern botanists are now writing them as one word or hyphenating them; for such is the law and the prophets. (See pp. 268-275).

*CAPILLUS VENERIS* Hill, l. c., 528, is *Adiantum* Linn. and *Cv. verus* Hill is *Adiantum Capillus-veneris* Linn. .

*Lonchitis aspera* Hill, l. c., 526, t. 74 is based on *Lonchitis Aspera vulgaris* Hill, l. c., which is *Lon. aspera minor* Bauhin which is *Osmunda Spicant* Linn. . Also *Struthiopteris* Weiss (1770) and *Lomaria* Willd. 1809. This genus is split off from *Blechnum* Linn. on its dimorphic fronds. (See pp. 276-278).

*Salpichlaena* J. Sm. is another segregate from *Blechnum* based on its twining bipinnate fronds. The type species is *S. volubilis* (Klf.) J. Sm. (see p. 276).

*Blechnum* Linn. has uniform, straight fronds not more than once pinnate. The type species is *B. occidentale* Linn. (See p. 276).

'*Gymnogramma* Desv., Berl. Mag. (1811) V, 304. Underwood in the Bulletin of the Torrey Botanical Club (1902) XXIX, 617-625, has attempted to relegate this generic name to



the voluminous lingo of synonymy. He enumerates the species listed by Desvaux, and in his order, but because the first named species is *G. rufa*, the genus, forsooth, must be reduced as a synonym of *Gymnopteris*, Bernhardt (1799), also based on this same species (the *Acrostichum rufum* Linn.), and this, notwithstanding the fact that eleven of the thirteen species actually represented a new generic element even as then understood, and that two of them were new to science! Can anyone imagine anything more absurd? The folly of designating the first named species (when the type is not indicated) as the type of a new genus cannot be better exemplified than by these two genera, (*Gymnogramma* and *Cassebeera*) with a total of fifteen species, thirteen of which represent new genera, yet the names, according to most authors of the present day, must be discarded for the names of a later day. What colossal stupidity! As stated above, I believe that a new generic name should go with the new generic element without regard to the position of the species (if more than one) that represents it; any other treatment of a new genus is unthinkable, should be construed as beyond the pale, outlawed! In *Gymnogramma*, the first two species enumerated, belonging to another genus, *Gymnopteris*, are automatically removed from the genus and from consideration. (See p. 291). *G. Acrostichoides* became *Leptochilus* Klf. (1824). (See p. 303). *G. leptophylla* and *G. Chaerophylla* became *Anogramma* Link (1841). See p. 279). *G. Tartarea* became *Pityrogramma* Link, (1833). (See p. 280). *G. Japonica* became *Coniogramme* Fée (1850). (See p. 291). *G. trifoliata* became *Trismeria* Fée (1850). (See p. 280). *G. filipendulaefolia*, *G. sulphurea*, *G. aurea*, *G. rosea*, and *G. flexuosa* have always remained as *Gymnogramma* until Underwood tries to discard it for *Psilogramme* Kuhn (1882). This is by the law of residues. Again if we follow the first author, subsequent to Desvaux, to use and interpret the genus, we have the same result. Swartz, in 1817, used the genus in its customarily accepted sense. He described a new species, *G. myriophylla* and for another he discarded the specific name *filipendulaefolia*

for one of his own coining, *Cheilanthes*, thus determining the permanent status of the genus. The species *G. filipendulaefolia* (Thouars) Desv. being common to both Desvaux and Swartz becomes the type of the genus. It was illustrated by Thouars, Fl. Trist. d'Ac. (1804) T. 4. *Gymnogramma* should be retained in place of *Psilogramme* Kuhn. Swartz at the same time published and illustrated *G. Asplenioides*, but it belongs to another and older genus and had already been published under another name. We have the same result under Article 45 of the International Rules; the name going with that part when properly segregated that retains the largest number of species. (See pp. 279-280).

*Cassebeera* Klf., Enum. Fil. (1824) 215-217, t. 1, fig. 11. Kaulfuss had two species, *C. triphylla* and *C. pinnata* in the order here given; the latter being the only one illustrated becomes the type of the genus. Underwood considered the first named species to be the type, but it is silly to think an author would illustrate his new genus with an aberrant or questionable species; rather would he use that species, if more than one, that he would construe as the more typical or the one on which the genus is founded; thus the illustrated species becomes the generic type, in this instance *C. pinnata*. Another good reason for considering this species to be the generic type is that it is the only new species in the genus. Primarily it was the study of new species that induced the creation of new genera; or new studies of old species. The new genus for the new species. The other had been long known. Although each species actually represents a new genus, as these are at present understood, yet *Cassebeera* has been discarded and each of Kaulfuss' species has been placed in separate genera under names of a later date. *Cassebeera* Klf., as here typified, has 17 years priority over *Pellaea* Link which latter name now sinks into synonymy. *Cassebeeria* Dennst. (1818) can in no wise interfere with the use of *Cassebeera* since it is spelled and pronounced differently and belongs to a widely different class of plants and in addition is a

pure synonym of *Sonerila* Roxb. . *C. triphylla* Klf. is now a species of *Doryopteris* J. Sm. (1841). (See pp. 279-282).

*Allosorus* Bernhardt, Schrad. Neu. Jour. (1806) I No. 2, pages 5 and 36 pro parta. *Cheilanthes* Swz., Syn. Fil. (1806) 5, 126. (See pp. 284-286).

Bernhardt based his genus on "Alle *Adianta spuria* Sw." Swartz, the same year, reduced it to a synonym of his own genus published later in the same year. Bernhardt apparently accepted this disposition of his own genus which permanently settles its status as synonymous with *Cheilanthes*; but as it has priority of publication it must supplant the later name. *Allosorus* Bernh. must be retained for 'Alle *Adianta spuria*, Sw.'" on which it was founded; or rather for the largest number of them which are congeneric; these are six out of the original nine, namely, *A. microphylla*, *A. fragrans*, *A. Caffrorum*, *A. parvilobium*, *A. tenuifolium* and *A. multifidum*. One of these must be the type of *Allosorus* Bernh. He did not name any of them under *Allosorus* unless it was the *Adiantum fragrans*; he published an *Allo. pusillus*, which is the same species. Therefore *Adiantum fragrans* Linn. f., one of the nine "Alle *Adianta spuria*, Sw." and the only one Bernhardt named or renamed under *Allosorus* must be construed as its type.

*Acropteris* Link, Hort. Berol. (1833) II 55, 56. Link had three species, one of which belongs to *Chamaefilix* which leaves the other two as typical of the genus. Type species is *A. radiata* Link, l. c., 56, which is *Acrostichum dichotomum* Forsk., non Linn. . Link, in 1841, renamed the genus *Actinopteris*. (See p. 289).

*Pteris* Linn. . Linnaeus in the Sp. Pl., did not name a type species; nor in the Genera Plantarum Ed. V., (1754) is there any indication of a type species or a reference to an earlier author. *P. longifolium* Linn., long has been considered the type and is here accepted in that sense. Hill in 1755 separated as *Filix-Foemina* the *Pteris aquilina* Linn. (Fam.

Herb.) ; he redescribed and illustrated it in the British Herbal (1756) 528, t. 74. His *Filix-Foemina vulgaris* is *Pteris aquilina* Linn. *Pteridium* Gleditsch (1760) is a synonym. The earlier name is accepted here. *Pteris aquilina* Linn. is accepted as the type of *Pteris* Linn. by some authors; but as Linnaeus had no types, Hill was justified in separating it from *Pteris* and his action is legitimate under the International Rules. *Pteris* has a single indusium; *Filix-Foemina* has a double indusium. Within the next seven or eight years three other authors followed Hill in taking out *Pt. aquilina* and making a new genus of it, each giving it a different name. This status can not now be changed. (See pp. 289, 290).

In Pittonia (1900) IV, pp. 103-107, Dr. E. L. Greene unequivocally shows that *OEtosis* Necker antedates *Vittaria* Sm. by three years and that Necker based his genus on the *Pteris lineata* Linn. . Dr. Benedict in the Bulletin of the Torrey Bot. Club (1914) XLI pp. 395-397 disagrees in favor of *Vittaria* Sm.; but his arguments are based upon suppositions instead of facts. I can not follow him. Dr. Greene has the best of the argument. (See p. 291).

*Candollea* Mirbel, Hist. Nat. Veg. (1803) V 86-89 (see p. 291). Underwood claims that the first species (*C. heterophylla*) is based upon *Acrostichum heterophyllum* Linn. (1753) and is supported by Maxon. C. Christensen claims that it is not, and refers it to *Cyclophorus spissus*.

Mirbel had four species based on older names; and these are reducible to three species constituting three new generic elements and one of them must be the type. Working under the American Code, Underwood proposed the first named species (*C. heterophylla*) as the type, claiming it to be based, as stated before, on *Acrostichum heterophyllum* Linn. and adopted it for *Pteropsis* Desv.; (*Drymoglossum* Pr.). Later he receded from this position, retaining *Drymoglossum* Pr., Mem. Torr. Bot. Cl. (1899) VI, 265 and 277; Cont. U. S. N. Herb. (1908) X, 486; Bull. Torr. Bot. Cl. (1903) XXX, 674. Christensen, Index Filicum (1905) 167 and 201 considers *C.*

*heterophylla* Mirbel a new species, and refers it to *Cyclophorus spissus*; also he refers two of the other three species to the same genus. Thus, according to Christensen, most of the new generic element of *Candollea* is congeneric with *Cyclophorus* Desv., 1811, a genus not published until 8 years later, yet he discards *Candollea* for the later name. Evidently he does not want a stable nomenclature. Under the International Rules, the genus *Candollea* containing three new generic elements, as now understood, must be divided. Selecting a type will be arbitrary. I therefore select the first named species, *C. heterophylla* (L.) Mirbel in order to be in unison with the American Code and thus produce fewer changes than there otherwise would be. Through the courtesy of Dr. John Hendley Barnhart, I have received a copy of the description of Mirbel's *C. heterophylla* as it appears in the 1825 edition; as this is only a verbatim reprint of the original edition it will answer the purpose and settle the question of the origin of the species. The name certainly is based directly by citation upon *Acrostichum heterophyllum* Linn., as Dr. Barnhart writes, and as claimed by Underwood. After the citation comes the French description which is that of the Linnaean species, at least as to the sterile plant, (the one from Java); the description of the Bourbon (fertile) plant may be and probably is as Christensen maintains, *Cyclophorus spissus*. *C. heterophylla* (L.) Mirb. p. p. is, then the type of the genus *Candollea* Mirbel and this must supersede *Pteropsis* Desv. and *Drymoglossum* Pr. .

*C. lanceolata* (L.) Mirb. and *C. longifolia* (Burm.) Mirb. are construed by Christensen to be synonymous and to be the same as *Cyclophorus Acrostichoides* (Forst.) Pr. . This being so, the proper name for the species is *Pyrrhosia lanceolatus* (Linn.) n. comb.; *C. Polypodioides* (L.) Mirbel is *Polypodium Polypodioides* (L.) A. S. H. and *Marginaria Polypodioides* (L.) Tidest. (See pp. 298,299).

"*Pyrrhosia* Mirbel, l. c. 92, is based upon *Chinensis* Mirb., a new species, which is a species of *Cyclophorus* Desv. 1811.

*Pyrrhosia* being the oldest available name for *Cyclophorus*, the latter name must be dropped for the former. (See p. 302).

*Ancimia* of authors is very complex and well can be split up. Swartz designated no type of his genus *Anemia*. In order to bring about as few changes as possible, I designate, under International Rules, *A. hirta* (Linn.) Swz. as the type. *A. hirta* and *A. Phyllitidis* were published by Swartz on page 155 of his Synopsis Filicum; these are the first two species named. J. Smith in 1842, made *A. Phyllitidis* the type of his genus *Anemidictyon* to contain the species with distinct fertile and sterile fronds united and veins anastomizing. (See p. 306). Under Article 45, Int. R., *Anemia* Swz. must be retained for the group with the larger number of species which leaves *A. hirta* Swz. as the type for the ferns with distinct fertile and sterile fronds united, veins not anastomizing, the group with the larger number of species. (See pp. 306, 307).

The above have short, stout rhizomes. Those species with long, slender, creeping rhizomes may well be restored as the genus *Ornithopteris* Bernh. of which *O. Adiantifolia* (L.) Bernh. is the type, it being the first species illustrated at place of publication (Schrader, Neu. Journ. (1806) I 50, t. 3 f. 15 a. The other species, *O. hirsuta* (L.) Bernh., l. c., f. 15 b., is automatically removed to *Anemia* Swz. a genus published later in the same year, which also leaves *O. Adiantifolia* the type by the rule of residues. I would maintain *Coptophyllum* Gardn. for those species with the distinct fertile and sterile fronds not united. If *Ornithopteris* Bernh. and *Anemia* Swz. should be construed as strictly synonymous, Swartz's name, under the International Rules, would have to lapse into synonymy in favor of the older name of Bernhardi. (See p. 307).

*Anemia*, *Anemidictyon*, *Ornithopteris* and *Coptophyllum* have distinct fertile and sterile fronds. *Trochopteris* Gardn. should be maintained for those species in which the sterile and fertile parts are not distinct. Of *Coptophyllum*, *C. Buni-*

*ifolium* Gardn. is the type. Of *Trochopteris*, *T. elegans* Gardn. is the type.

The Brazilian ferns of Mrs. James Watson Webb, mentioned in this paper, were collected in 1867 and 1868 near Rio de Janeiro and Bahia. Baron von Tuerckheim's Guatemala ferns were collected in the middle eighties at altitudes of from 4,000 to 14,000 feet at Alta Vera Paz. Such specific names as *Adianti-folium* are capitalized as per Recommendation X. The only instances in which I have not followed the International Rules are those providing for the decapitalization of geographical specific names and the abolition of duplicate names, i. e., when the specific name merely repeats the generic name.

#### HYMENOPHYLLACEAE:

##### TRICHOMANES Linn. Filmy Fern.

Sect. *Gonocormus* (v. d. B.) n. comb., (Subgen., C. Chr.)

*T. parvulum* Poir. Sandwich Islands, Dr. A. B. Lyons, 1887.

Sect. *Eudidymoglossum* (Pr.) n. comb., *Didymoglossum* sect. *Eudidymoglossum* Presl. in part.

*T. Petersii* A. Gr. Moulton, Ala., C. Mohr.

*T. punctatum* Poir. Jamaica, John Hart.

*T. reptans* Swz. Guatemala, Tuerckheim No. 847.

Sect. *Lacostea* (v. d. B.) C. Chr.

*T. pedicellatum* Desv. Bolivia: Rusby No. 185 (as *T. brachypus* Kze.).

Sect. *Achomanes* (Pr.) n. comb. (C. Chr. as subgenus)

*T. crinitum* Swz. Bolivia: Bang No. 906.

*T. crispum* L. Bolivia: Rusby No. 184. Brazil: Mrs. Webb No. 283.

*T. pinnatum* Hedw. Venezuela: Dr. R. P. Stevens 1869.

*T. Polypodioides* Linn. Guatemala, Tuerckheim No. 652. Brazil, Mrs. Webb No. 278 (both as *T. sinuosum* Rich.).

Var. *incisum* (Klf.) n. comb., *T. incisum* Klf. non Thunb,



Bolivia, Rusby No. 138, as (*T. sinuosum* Rich.).

Sect. *Eutrichomanes*, Prantl.

*T. capillaceum* Linn. Guatemala, Tuerckheim No. 846. New Granada, Triana No. 192. (Both as *T. trichoideum* Swz.).

*T. Baucrianum* Endl. Sandwich Islands, Dr. A. B. Lyons, 1887 (as *T. Meifolium* Bory.).

*T. humile* Forst. var. *Draytonianum* n. comb.

*T. Draytonianum* Brack. Sandwich Islands, without data. Two sheets, one as *T. obtusa?* and the other as *T. lanceolata?*

*T. radicans* Swz. Brazil, Mrs. Webb, Nos. 267 and 361.

Var. *Sandvicense* (v. d. B.) n. comb., *T. Sandvicense* v. d. B. Sandwich Islands, Dr. A. B. Lyons, 1877 (as *T. Davallioides* Gaud.) and one sheet without data (as *T. radicans?*).

Var. *Kuntzeanum* (Hk.) Baker. Bolivia, Rusby No. 139.

Var. *Luschnatianum* (Pr.) Baker. Brazil, Mrs. Webb No. 250 (as *T. brachypus* Kze.).

*T. rigidum* Swz. Brazil, Mrs. Webb No. 253.

*T. tenerum* Spr. Brazil, Mrs. Webb No. 277.

#### HYMENOPHYLLUM Sm.

*H. axillare* Swz. Yungas, Bolivia, Bang No. 349, 1890 (as *H. ciliatum* Swz.). New Granada, Triana, No. 185.

*H. ciliatum* Swz. Bolivia: Rusby Nos. 183 and 135; Bang No. 436, No. 897 (as *H. Polyanthos* Swz.) and No. 349a (as *H. protrusum* Hk.).

*H. interruptum* Kze. Guatemala, Tuerckheim, No. 647.

*H. lanceolatum* Hk. and Arn. Sandwich Islands, Dr. A. B. Lyons, 1877.

*H. marginatum* Hk. and Grev. W. Tasmania, J. B. Moore, 1894.

*H. microcarpum* Desv. Bolivia: Rusby No. 137 and Bang No. 555a.

*H. obtusum* Hk. and Arn. Cape of Good Hope, Schlechter, No. 113, Dec. 25, 1891.

*H. peltatum* (Poir.) Desv., var. *Wilsoni* (Hk.) n. comb., *H. Wilsoni* Hk. Bide of Arran, Scotland, Sept. 24, 1850. Name of collector not given.



*H. Polyanthos* Swz. Bolivia: Rusby No. 136 and Bang No. 1384.

Var. *minimum* (Kze.) n. comb., *H. brevistipes* f. *minimum* Kze. Bolivia, Rusby No. 187.

Var. *protrusum* (Hk.) n. comb., *H. protrusum* Hk. Bolivia: Rusby No. 186 (as *H. Polyanthos* Swz.); Bang No. 349a (2 sheets) and No. 349b. (2 sheets as *H. Fucooides* Swz.?).

Var. *villosum* (Col.) n. comb., *H. villosum* Colenso. New Zealand, Allan Cunningham.

*H. recurvum* Gaud. Sandwich Islands, Dr. A. B. Lyons, 1877.

*H. Tunbridgense* (L.) Sm. Cape of Good Hope, Schlechter, No. 112, Dec. 25, 1891.

#### CYATHEACEAE, Tree Ferns:

CIBOTIUM Klf.

*C. Chamissoi* Klf. Sandwich Islands, Dr. A. B. Lyons, 1862.

CYATHEA Sm.

*Cy. arborea* (L.) Sm. Jamaica, G. F. Curtis.

*Cy. furfuracea* Baker. Bolivia, Bang No. 2318.

*Cy. Moluccana* R. Br. (*C. Brunonis* Wall.) Sumatra, Korthals, 1866.

*Cy. Schanschin* Mart. Bolivia: Rusby No. 121 and Bang No. 562. Brazil, Mrs. Webb No. 374.

*Cy. Serra* Willd. Grenada? A sheet without data from the Herb. of the Trinidad Botanic Gardens.

HEMITELIA R. Br.

*H. Kohautiana* (Pr.) Kze. One sheet without data, distributed at *H. grandifolia* Spreng. but belongs to this species as re-defined by Maxon.

*H. subincisa* Kunze. Mapiri, Bolivia, Rusby No. 149 (as *H. grandifolia* Spr.). This specimen agrees perfectly with pl. 20, f. 22 and pl. 40, fig. II in Vol. 1, pt. 2 of the Flora Brazilianensis, named *Hemitelia grandiflora*, but not with the description (311 and 312); but rather with the description of *H.*

*subincisa* Kze. (311). Certainly it is not *H. grandiflora* (Willd.) Spr. as illustrated and delimited by Maxon.

ALSOPHILA R. Br.

*A. australis* R. Br. Dandenong Hills, Victoria, A. Morrison, July 3, 1891.

*A. Blechnoides* (Rich.) Hk. Lower Orinoco, Rusby and Squires, No. 123, 1896.

*A. elegans* Mart. Brazil, Mrs. Webb No. 245.

*A. gigantea* (Wall.) Wall. Syhhet, India, M. R. Smith 1815 and, by the same collector, Nepal, 1821 (as *A. glabra* Hk.).

*A. latebrosa* Hk., var. *Schmidiana* Kze. Malabar, Concan, etc., ex Herb. Ind. Or. Hk. f. and Thomson.

*A. microdonta* (Desv.) Desv. New Granada, Triana No. 207 (as *A. ferox* Poir.). Brazil, Mrs. Webb No. 287 (as *A. armata* Mart.).

*A. phalerata* Mart., var. *infesta* (Kze.) n. comb., *A. infesta* Kze. Yungas, Bolivia, 6000 ft., Rusby No. 122 (3 sheets) (as *Cyathea*).

*A. pubescens* Baker. Bolivia, Rusby No. 424.

*A. quadripinnata* (Gmel.) C. Chr. Bolivia, Bang Nos. 484, 1848 and 2200 (as *A. pruinosa* Klf.). Brazil, Mrs Webb Nos. 303 and 363 (as *A. pruinata* Klf.).

*A. Salvinii* Hk. Guatemala, Tuerchheim, No. 845 (two sheets).

POLYPODIACEAE:

WOODSIA R. Br.

*W. alpina* (Bolton) S. F. Gray. Germany, Dr. Rabenhorst; British America, E. A. Rau. Both on the same sheet and each labeled *W. glabella* R. Br.

*W. glabella* R. Br. Willoughby Mt., Vt., Dr. H. H. Rusby, July 23, 1892.

*W. Ilvensis* (L.) R. Br. The type species. East Greenland, N. Y., Dr. Asa Fitch, 1865 (as *W. hyperborea*). Shelburne, Mass., Miss S. E. Anderson, June 13, 1873. Greenland, 1881.

*W. Mexicana* Fée. Mogollon Mts., N. Mex., Rusby No. P. August 1881. Northern Lower California, C. R. Orcutt.

*W. obtusa* (Spr.) Torr. Conn., Miss S. E. Anderson, July 1874. Hanover, Ind., A. H. Young, June 1879. N. w. Ark., Harvey No. 99.

Var. *glandulosa* Eaton and Faxon. *W. Plummerae* Lemmon. Burro Mts., N. Mex., Rusby No. 0. Sept 3, 1880. (2 sheets) and No. 0., Sept. 7, 1880. Chihuahua, Mex., Pringle No. 834, Sept. - Oct., 1886.

Var. *Peruviana* (Hk.) Baker, *W. Peruviana* Hk. Bolivia: Rusby, Nos. 337 and 338 and Bang No. 878.

*W. Oregana* D. C. E. Boulder Colo., Patterson, No. 302. July 9, 1892. Eastern Oregon, T. J. Howell, May, 1880.

*W. scopulina* D. C. E. Falcon Valley, Wash., W. N. Suksdorf, July 10, 1882.

#### HYPODERRIS R. Br.

*H. Brownii* J. Sm.: Trinidad, West Indies without data. FILICULA Seguier. (See p. 234). Bladder Fern.

*Filic. bulbifera* (L.) n. comb., *Cystopteris bulbifera* (L.) Bernh. Michigan: Farwell, No. 6064 near Farmington, Sept. 28, 1921 and No. 6424 at Oxford, Oct. 4, 1927. Rockdale, Pa., E. A. Rau.

Var. *horizontalis* (Lawson) n. comb., *Cystopteris bulbifera* var. *horizontalis* Lawson. This is the variation with a short, broad blade, triangular-lanceolate in outline, 3 or 4 times as long as broad; the typical form of the species is narrower and 6-8 times as long as broad. Holyoke, Mass., Miss Fannie Upson, 1874. Willoughby, Vt., H. H. Rusby, July 23, 1892. A cultivated plant, M. L. Stevens, Sept. 9, 1892.

*Filic. Douglasii* (Hook.) n. comb., *Cystopteris Douglasii* Hk.: Sandwich Islands, Dr. A. B. Lyons, 1877.

*Filic. Filix-fragilis* (Linn.) n. comb., *Polypodium Filix-fragilis* Linn. Utica, Mich., Farwell No. 6086, Oct. 5, 1921. Mogollon Mts., N. Mex., Rusby No. Q, Sept. 1881. Upper La-Plata R., Colo., Baker, Earle and Tracy No. 988, July 13, 1898.

New Grenada, Triana No. 200. Sorata, Bolivia, Rusby No. 319, Dhauli Valley, India, J. F. Duthie No. 6273, Aug. 6, 1886.

Var. *angustata* (Hoffm.) n. comb., *Polypodium fragile* v. *angustatum* Hoffm. One sheet without data. Well illustrated in D. C. E., Ferns N. A., II, pl. 53, f. 6.

Var. *lobulato-dentata* (Koch) n. comb., *Cystopteris fragilis* var. *lobulato-dentata* Koch. Wissahichan Creek, Pa., H. H. Rusby, 1874; (also a specimen of the specific type on the same sheet). Grand Ledge, Mich., Farwell, No. 6553, June 10, 1923.

Var. *regia* (L.) n. comb., *Polypodium regium* Linn. Horgis, Hungary (as *P. fragile* without other data).

*Filic. montana* (Lam.) n. comb., *Polypodium montanum* Lam. Birch forest near Budhi Village, India, J. F. Duthie, No. 6274, July 18, 1886.

STRUTHIOPTERIS Willd. (See pp. 234, 235).

*S. Struthiopteris* (L.) n. comb., *Osmunda Struthiopteris*, Linn.). The Ostrich Fern of Europe. Ex. Herb. Meisner without data.

Var. *Pensylvanica* (Willd.) n. comb., *Struthiopteris Pensylvanica* Willd., *Onoclea nodulosa* Schk. non Mx. which is *Lorinseria areolata* (Linn.) Pr.. Our Ostrich Fern is one of our grandest ferns. I have seen it 10 feet high in favorable situations and again reduced to 1 foot in height where the land had been cleared and drained. Willoughby, Vt., H. H. Rusby, July 25, 1892. Shelburne, Mass., Miss S. E. Anderson, 1874.

ONOCLEA Linn.

*O. sensibilis* Linn. The Sensitive Fern. Utica, Mich., Farwell No. 6088, Oct. 5, 1921. Shelburne, Mass., Miss Anderson, May 24, 1873. La Fayette, Ind., A. H. Young, Sept. 1878.

Var. *obtusilobata* (Schk.) Torr.: Fitzwilliams, N. H., M. L. Stevens, Aug. 10. 1892.

FILIX-MAS Hill. (See pp. 235, 236). Male Fern or Shield Fern.

*Fm. amplissima* (Pr.) n. comb., *Polystichum amplissimum* Pr. Brazil, Mrs. Webb No. 338.

*Fm. augescens* Link.) n. comb., *Aspidium augescens* Link. Fla.: St. Augustine, Mary C. Reynolds, 1876; Halifax River, A. H. Curtiss No. 3743 June; H. D. Keeler, without data (all as *Aspidium patens* Swz.); Nassau, New Providence, Bahamas, Mrs. Webb No. 333, 1870 (as *Dryopteris patens* (Swz.) Kuntze).

Var. *puberula* (Fée) n. comb., *Aspidium puberulum* Fée (not of Gaud. nor of Desv.). Bolivia, Bang No. 2313 (as *Nephrodium puberulum* Baker).

Var. *normalis* (C. Chr.) n. comb., *Dryopteris normalis* C. Chr.; Fla.: Eustis, G. V. Nash Nos. 840 and 861 (as *Dry. patens* (Swz.) Kuntze). Yucatan, Valdez No. 19 (as *Asp. patens* Swz.). Nassau, New Providence, Bahamas, Mrs. Webb No. 280 (as *Dry. patens* Swz.) Kuntze).

*Fm. Benedictii* (Farw.) n. comb., *Filix Benedictii* Farwell. *Dry. Clintoniana* X *spinulosa* Benedict. Rochester, Mich., Farwell No. 5186, Oct. 6, 1918.

*Fm. Boottii* (Tuckerm.) n. comb., *Aspidium Boottii* Tuckerm. Utica, Mich., Farwell No. 6087a, Oct. 5, 1821. West Roxbury, Mass., M. L. Stevens, Sept. 19, 1892. Mrs. M. O. Rust without data. One sheet as *Asp. spin. v. dilatatum* without data. Head of Skaneateles Lake, N. Y., Mrs. J. F. Myers 1878.

*Fm. cristata* (L.) n. comb., *Polyp. cristatum* L. Michigan: Utica, Farwell Nos. 6099 and 6101, Oct. 5, 1921; Oxford, No. 6116, Oct. 12, 1921; and Rochester No. 6124, Oct. 20, 1921. Shelburne, Mass., Miss Anderson, July 1874. Near Port Henry, N. Y., N. L. Britton, July 1878. Montclair, N. J., Rusby, 1879. On the same sheet as the last is the lower part of a stipe of *Fm. Filix-mas* but what its history is I do not know.

Var. *Clintoniana* (D. C. E.) n. comb., *Aspidium cristatum* var. *Clintonianum* D. C. E. My collections from Michigan as

follows: Utica Nos. 4179, June 6, 1916 and 6078, Oct. 5, 1921; Oxford No. 6117, Oct. 12, 1921. Mrs. M. O. Rust without data. Hatfield, Mass., M. L. Stevens, Sept. 4, 1892.

Var. *Floridana* (Hk.) n. comb., *Nephrodium Floridanum* Hk. Fla.: St. Augustine, Mary C. Reynolds 1876; Eustis, Nash No. 773; H. D. Keeler without data.

*Fm. decomposita* (R. Br.) n. comb., *Nephrodium decompositum* R. Br. Dandenong Ranges, Victoria, Baron von Mueller, 1892 (2 sheets).

*Fm. Dowellii* (Farw.) n. comb., *Filix Dowellii* Farwell, Utica, Mich., Farwell No. 4179a, June 6, 1916.

*Fm. effusa* (Swz.) n. comb., *Polyp. effusum* Swz. Jamaica, G. F. Curtis, Trinidad, No. 4432. Brazil, Mrs. Webb, No. 348.

*Fm. Filix-mas* (Linn.) n. comb., *Polyp. Filix-mas* Linn., Male Fern. The rhizome and stipes are official in pharmacopoeias, usually as "*Aspidium*." Hauniva, John Lang, July 1880.

Var. *subintegra* (Doell) n. comb., *Aspidium Filix-mas* var. *subintegrum* Doell. Basses Pyrenees, Mrs. Webb, Aug. 1871 (as *Lastrea Montana*).

Var. *paleacea* (Swz.) n. comb., *Aspidium paleaceum* Swz. Bolivia, Bang No. 1784. Sandwich Islands, Dr. A. B. Lyons, 1877 (as *Neph.* and *Aspid. Filix-mas*).

*Fm. fragrans* (L.) n. comb., *Polyp. fragrans* Linn. Sitka, Alaska, Kennicott, 1850.

Var. *Hookeriana* (Fern.) n. comb., *Thelypteris fragrans* var. *Hookeriana* Fernald. Isle Royale, Dr. A. B. Lyons, 1868. Keweenaw Co., Mich., Farwell No. 557, Oct. 10, 1884 (both as *Aspidium fragrans* Swz.).

*Fm. Goldiana* (Hk.) n. comb., *Aspidium Goldianum* Hk. Farwell in Mich. as follows: Rochester, Nos. 4676a, Oct. 7, 1917 and 6127, Oct. 20, 1921; Farmington, No. 6072, Sept. 28, 1921. One sheet without data.

*Fm. immersa* (Bl.) n. comb., *Aspidium immersum* Bl. Java, Dr. Blume without other data.

*Fm. lanceolata* (Baker) n. comb., *Nephrodium lanceolat-*

um Baker. Guatemala, Tuerckheim No. 626 two sheets (as *Neph. hirtum* Hk.).

*Fm. latifrons* (Brack.) n. comb., *Lastrea latifrons* Brack. Sandwich Islands, Dr. A. B. Lyons 1877 (as *Asp. glabrum* Mett.).

*Fm. lugubris* (Kze.) (*Polypodium lugubre* Kze.) var. *conspersoides* (Fée) n. comb., *Aspidium conspersoides* Fée. Bolivia, Rusby No. 426.

*Fm. marginalis* (L.) n. comb., *Polyp. marginale* Linn. Michigan: Farwell, No. 6423, Oct. 4, 1922 at Oxford and No. 6556 June 10, 1923 at Grand Ledge. Shelburne, Mass., Miss Anderson, Aug. 1874. Mts. of Essex Co., N. J., H. H. Rusby, Aug. 1879. N. w. Ark., Harvey No. 98.

*Fm. montana* (Vogler) n. comb., *Polyp. montanum* Vogler. *Polyp. Oreopteris* Ehrh. Southern slope of Skiddaw, Co. Cumberland, Eng., Charles Bailey, No. 1637, Sept. 18, 1882, 1500 ft.

*Fm. Noveboracensis* (L.) n. comb., *Polyp. Noveboracense* Linn. Michigan: Farwell No. 4508, Sept. 12, 1917 at Rochester; No. 4690, Oct. 17, 1917 at Goodison; No. 6067 Sept. 28, 1921 at Farmington; and No. 6007a, Sept. 14, 1921 at Washington. N. w. Ark., Harvey No. 97. East Greenwich, N. Y., Dr. Asa Fitch, 1867. Shelburne, Mass., Miss Anderson, July, 1874. Mrs. M. O. Rust, without data (as *Asp. Noveb.* var. *suaveolens*).

*Fm. opposita* (Vahl.) n. comb., *Aspidium oppositum* Vahl., *Aspidium conterminum* Willd. Bolivia: Rusby Nos. 432 and 436; Bang No. 2316.

Var. *pilosula* (Kl.) n. comb., *Aspidium pilosulum* Klotsch., *A. conterminum* var. *pilosulum* (Kl.) E. G. B. Bolivia, Rusby No. 434.

Var. *rivulorum* (Raddi) n. comb., *Polyp. rivulorum* Raddi. Bolivia, Rusby No. 421.

Var. *oligocarpa* (H. & B.) n. comb., *Neph. conterminum* var. *oligocarpa* (H. & B. ex Willd.) Baker. Bolivia, Rusby Nos. 430 and 435. Guatemala, Tuerckheim No. 805 (two sheets).

Var. *hirtella* n. var. Like the preceding variety, differing only in its pubescence; the entire under surface is covered with stiffly spreading white hairs. Sorata, Bolivia, Rusby No. 422, Feb. 1886.

Var. *Kaulfussii* (Link.) n. comb., *Aspidium Kaulfussii* Link. Bolivia: Rusby No. 429; Bang No. 2321. Guatemala, Tuerckheim No. 168 (as *Aspidium rufum* Mett., var.).

In all the varieties of this species, there is no sign of an indusium on the mature sorus; but at the ends of the pinnae where immature sori are found, the indusia are quite distinct except in the last variety where they are few and difficult to detect.

*Fm. patens* (Swz.) n. comb., *Polyp. patens* Swz. Brazil, Mrs. Webb No. 302 (as *Asp. molle* Desv.).

Var. *invisa* (Swz.) n. comb., *Polyp. invisum* Swz., *Neph. Sloani* Baker, *Dryopteris oligophylla* Max. Brazil, Mrs. Webb No. 325 (as *Dry. macroura* (Kaulf.) Kuntze) and No. 322 (two sheets as *Neph. molle*).

*Fm. patula* (Swz.) (*Aspidium patulum* Swz.) var. *Chaerophylloides* (Moritz) n. comb., *Aspidium Chaerophylloides* Moritz. Guatemala, Tuerckheim No. 703 (as *Neph. patulum* Baker).

*Fm. rigida* (Hoffm.) n. comb., *Polyp. rigidum* Hoff. It is not customary to record the typical form of this species from America. I have not seen it (the European); but certain Oregon collections seem to fit the description and illustrations and D. C. Eaton said that if these Oregon specimens were placed amongst European ones, they would go unquestioned. The fronds are linear-oblong or linear- or oblong-lanceolate. Roots of trees on the banks of Wilhelmina R., West Oregon, Mrs. R. W. Summers, July 1887 (as *Asp. rigidum* Swz.). Rocky places among small trees, Pacific Coast of Oregon, T. J. Howell, Aug. 1881 (two sheets as *Asp. rigidum* var. *argutum* Eaton).

Var. *Americana* (Hk.) n. comb., *Neph. rigidum?* var. *Americanum* Hk., *Asp. rigidum* var. *argutum* D. C. E. Fronds deltoid-ovate to ovate-lanceolate. So. California, D. Cleveland,



July 1880. Coast Mts. Yeamill Co., Oregon, Mrs. R. W. Summers, June 1879 (as *Asp rigidum* Swz., var. *argutum* Eaton). In copying localities, etc. I use the spelling found upon the labels.

*Fm. spinulosa* (Muell.) n. comb., *Polyp. spinulosa* Muell. Farwell in Michigan as follows: Junior, No. 4806, Oct. 18, 1917; Oxford, No. 5615a, Aug. 22, 1920 and Nos. 6105, 6110 and 6111, Oct. 12, 1921; near Farmington Nos. 6066 and 6070 Sept. 28, 1921; Washington, No. 6204, June 21, 1922; Utica, No. 6082, Oct. 5, 1921. The following appear to be intermediate between this and var. *Americana*: Utica, No. 6100a, Oct. 5, 1921; Oxford, No. 6109, Oct. 12, 1921; Rochester, Nos. 6122 and 6123, Oct. 19, 1921; Farmington, No. 6061, Sept. 28, 1921; Northville, No. 6466, Oct. 18, 1922. St. Croix Falls, Wisc., E. P. Sheldon, Sept. 1891.

Var. *elevata* (A. Br.) n. comb., *Aspidium spinulosum* var. *elevatum* A. Br. ex Doell. Bornholm, Denmark, J. Bergstedt, July 1864.

Var. *Americana* (Fischer) n. comb., *Aspidium spinulosum* var. *Americanum* Fischer; *Dryopteris spinulosa* var. *Americana* (Fischer) Fernald. Michigan: Farwell. Junior, No. 4807, Oct. 28, 1917; also Oxford No. 561b, Aug. 22, 1920 and No. 6513, June 6, 1923. Rye, N. H., A. A. Eaton, Sept, 1895 (as *Dry. spinulosa* v. *dilatata* Hoffm.).

Var. *intermedia* (Muhl.) n. comb., *Aspidium intermedium* Muhl. ex Willd. Farwell in Michigan as follows: Utica, No. 4172 June 6, 1916 and Nos. 6080, 6081, 6084 and 6097, Oct. 5 1921; Farmington, No. 5716, Dec. 12, 1920 and No. 6062, Sept. 28, 1921; Oxford, Nos. 6104, 6112, 6118 and 6118½, Oct. 12, 1921; Rochester, Nos. 6121 and 6121½, Oct. 19, 1921; Grand Ledge, No. 6572, June 10, 1923. Rockford, Ill., M. E. Holmes, (two sheets as *Asp. spin.* var. *dilatatum* Gray). N. J., H. H. Rusby. Mrs. M. O. Rust without data (two sheets, one as *Asp. spin.* var. *intermedium* and the other as var. *dilatatum*). Shelburne, Mass., Miss Anderson, 1874 and Franklin, N. J., H. H. Rusby, Oct. 15, 1878 (each as *Aspidium spinulosum*).

*Fm. squamigera* (Hk. and Arn.) n. comb., *Nephrodium squamigerum* Hk. and Arn. Sandwich Islands, Dr. A. B. Lyons, 1887 (as *Asp. latifrons* Brack.).

*Fm. Thelypteris* (L.) n. comb., *Acrostichum Thelypteris* Linn. Hungary without data.

Var. *pubescens* (Lawson) n. comb., *Thelypteris palustris* var. *pubescens* (Lawson) Fernald. Oxford, Mich., Farwell Nos. 5615, Aug. 22, 1920 and 6422, Oct. 4, 1922. N. w. Ark., Harvey No. 96. Shelburne, Mass., Miss Anderson, Aug. 1874.

Var. *linearis* (Farw.) n. comb., *Filix Thelypteris* var. *linearis* Farwell. Fronds 3 or 4 feet in height, 6-8 inches wide, bipinnate, pinnae 3 or 4 inches long, 0.75-1.25 inches wide, pinnules linear, 0.50-1.50 of a line wide, 4 to 8 lines long, acute or obtusish. Otherwise like var. *pubescens*. Oxford, Farwell, No. 6114, Oct. 12, 1921.

Subvar. *frondosa* (Farw.) n. comb., *Lilix Thelypteris* var. *linearis* f. *frondosa* Farw. Analogous to *Osmunda cinnamomea* var. *frondosa*; some of the pinnules of the sterile fronds bearing a few scattered sori. Oxford, Farwell, No. 6115, Oct. 12, 1921.

Var. *simulata* (Dav.) n. comb., *Aspidium* (and *Dryopteris*) *simulata* Dav. Differs from the typical form of the species in having the veinlets not forked. Seabrook, N. H., A. A. Eaton, Oct. 13, 1895.

*Fm. villosa* (L.) n. comb., *Polyp. villosum* Linn. Brazil, Mrs. Webb, No. 363.

Var. *inaequilateralis* (B. D. Gilbert) n. comb., *Dry. villosa* var. *inaequilateralis* B. D. Gilb.: Bolivia, Bang, No. 2394.

#### CYCLOSORUS Link. (See p. 236)

*Cyc. brachyodus* (Kze.) n. comb., *Polyp. brachyodus* Kze. One sheet of sterile plants which I place here. Venezuela, Dr. R. P. Stevens, 1869 (as *Polyp. goniopteris*).

*Cyc. Cyatheoides* (Klf.) n. comb., *Aspidium Cyatheoides* Klf. Sandwich Islands, Dr. A. B. Lyons, 1877.

Var. *exaltatus* (Hillb.) n. comb., *Aspidium Cyatheoides*

var. *exaltatum* Hillb. Sandwich Islands, Heller No. 1990 (as *Pteris decipiens* Hk.).

*Cyc. goggilodus* (Schk.) n. comb., *Aspidium goggilodus* Schk., *Cyc. gongylodus* Link. Eustis, Fla., Nash No. 1029 (as *Dry. unita glabra* (Mett.) Underw.).

Var. *hirsutus* (Mett.) n. comb., *Asp. unitum* var. *hirsutum* Mett. Brazil, Mrs. Webb No. 279 (as *Dry. gongylodes* (Schk.) Kuntze).

*Cyc. parasiticus* (L.) n. comb., *Polyp. parasiticum* Linn., *Aspidium molle* (Jacq.) Swz. One sheet Ex Hort. Bot. Basil as *Asp. molle* Link. Mapiri, Bolivia, Rusby No. 437 (two sheets as *Asp. falciculatum* Raddi).

*Cyc. Serra* (Swz.) n. comb., *Polyp. Serra* Swz.: Hayti, Jaeger, No. 132.

*Cyc. truncatus* (Poir.) n. comb., *Polyp. truncatum* Poir. Sandwich Islands, Dr. A. B. Lyons, 1877.

SAGENIA Presl. (See p. 235).

*Sa. Cicutaria* (Linn.) Moore. One sheet from Jamaica, G. F. Curtis, without date. This is the type species of *Sagenia* Presl.

Var. *Apiifolia* (Hk.) n. comb., *Aspidium Apiifolium* Schk., *Nephrodium Cicutarium* var. *Apiifolium* Hk. Sandwich Islands, Mrs. Gulick.

Subvar. *pubescens* n. comb., *Asp. Apiifolium* var. *pubescens* Hillb. Sandwich Islands: Dr. A. B. Lyons, 1877; also one sheet without data.

In the Sandwich Islands forms or variations, the rachises and stipes are purplish brown and polished; in the West Indian, stramineous and dull.

*Sa. Martinicensis* (Spr.) n. comb., *Asp. Martinicense* Spr.; *Asp. macrophyllum* Rudolphi. Brazil, Mrs. Webb No. 375. Bolivia, Rusby No. 413.

DIDYMOCHLAENA Desv. (See p. 236).

*Di. lunulata* (Houtt.) Desv. Bolivia, Rusby No. 117. Brazil, Mrs. Webb. No. 273. (Each as *Dryopteris lunulata*).

CYCLOPELTIS P. Sm. See p. 236).

*Cy. semicordata* (Swz.) J. Sm. New Granada, Triana, No. 191 (as *Aspidium semicordatum*).

POLYSTICHUM Roth.

*Polypodium aculeatum* Linn., (*Aspidium angulare* Kit. ex Willd.) is accepted as the type of the genus. (See p. 236).

*Polys. Acrostichoides* (Mx.) Schott. Near Farmington, Mich., Farwell No. 6063, Sept. 28, 1921. Castleton, N. Y., Dr. Asa Fitch, 1867. N. w. Ark. Harvey No. 95. Franklin, N. J., Dr. Rusby, Aug. 1874. Brandon, Vt., F. H. Knowlton, Aug. 1882.

Var. *incisum* (A. Gr.) A. Gr. Kensington, N. H., A. A. Eaton, 1895. Wheeling, W. Va., H. N. Mertz, Sept. 28, 1878. River Junction, Fla., G. V. Nash No. 2387 as *Dry. Acrostichoides* (Mx.) O. K. Two sheets, one by Mrs. M. O. Rust, without data.

*Polys. aculeatum* (Linn.) Schott., *Polypodium aculeatum* Linn.; Hudson. *Polys. angulare* (Kit.) Presl. Hungary, K. Richter Aug. 1887 (as *Aspidium*).

Var. *Braunii* (Spenn.) Dav., *Polis. Braunii* var. *Purshii* Fern. Lake Linden, Mich., Farwell No. 6593, June 25, 1923. Stowe and Smuggler's Notch, Vt., Ezra Brainerd June 17, 1878 (two sheets).

Subvar. *Haleakalense* (Brack.) n. comb., *Polys. Haleakalense* Brack.: Sandwich Islands, Dr. A. B. Lyons, 1877.

Var. *Dudleyi* (Max.) Jepson. Monterey Co., Calif., without other data.

Var. *microsorium* (Fée) n. comb., *Polys. microsorium* Fée. I would place here a specimen of Mrs. Webb, No. 246 from Brazil, distributed as *Dry. aculeata* (L.) O. K.

Var. *scopulinum* ~~A~~Eaton n. comb., *Asp. aculeatum* var. *scopulinum* Eaton. Mt. Adams, Wash., L. F. Henderson, Aug. 13, 1882.

*Polys. Adiantiforme* (Forest.) J. Sm. Brazil, Mrs. Webb, No. 244 (as *Dry. Capensis* (L.) O. K.).

*Polys. aristatum* (Forst.) Pr. Mts. near Nilghiri, India, G. Thomson (as *Lastraea aristata* Moore). 1 sheet without data, comm. Walker-Arnott, Sept. 1850 (as *Asp. Coniifolium* Wall.).

Var. *Voniifolium* (Wall.) n. comb., *Asp. aristatum* var. *Coniifolium* (Wall.) Baker. Sandwich Islands, Dr. A. B. Lyons, 1877.

*Polys. denticulatum* (Swz.) J. Sm. New Grenada, Triana No. 202.

*Polis. Illicifolium* (Don) Moore. Forest near Sosa, India, J. F. Duthie, No. 6237, July 12, 1886; alt. 8-9000 ft..

*Polys. Lemmoni* Und. Mt. Stuart, Wash., Sandberg and Leiberg, No. 812, Aug. 9, 1883 (as *Asplenium Mohrioides* Bory).

*Polys. lobatum* (Huds.) Presl. Basses Pyrenees, Mrs. Webb, Aug. 1871 (as *P. aculeatum*).

Var. *Hillebrandii* (Carruth.) n. comb., *Polys. Hillebrandii* Carruth. Sandwich Islands, Dr. Lyons, 1882.

*Polys. Lonchitis* (L.) Roth. Greenland, J. Vahl. Switzerland, Lohr, Aug. 15, 1887. Austria, Keck.

*Polys. munitum* (Klf.) Presl. Coast Mts. Yeamill Co., Oregon, Mrs. Summers, 1874 (2 sheets).

*Polys. triangulum* (Linn.) Fée. Guatemala, Tuerckheim No. 851.

#### TECTARIA Cav.

Type species is *T. trifoliata* (Linn.) Cav. (See p. 236).

*Tec. trifoliata* (L.) Cav. Lower Orinoco region, Rusby and Squires No. 383, May 1896.

Var. *Heracleifolia* (Willd.) n. comb., *Asp. Heracleifolium* Willd. Trinidad (without data as *Asp. trifoliatum*). Without locality, Wright, Parry and Brummel, Jan.—May, 1871 (as *Asp. trifoliatum* Swz.). Panama, J. Hart, No. 35, Nov. and Dec. 1885 (as *Asp. macrophyllum* Swz.).

Var. *minima* (Underw.) n. comb., *Tectaria minima* Und. Guatemala, Tuerckheim, No. 467 (2 sheets as *Asp. trifoliatum* Swz.). Brazil, Mrs. Webb No. 360 (as *Dry. trifoliata*).

## OLEANDRA Cav.

Type species *O. neriiformis* Cav. (See p. 236).

*Oleandra Wallichii* (Hk.) Presl. Forest near Sosa, India, J. F. Duthie No. 6290, July 13, 1886; Alt. 8—9000 ft.

## ARTHROPTERIS J. Sm.

Type species is *A. tenella* (Forst.) J. Sm. (See p. 236).

*Ar. obliterated* (R. Br.) J. Sm. Queensland, Baron von Mueller, without date and as *Asp. ramosum* Beauv.

## ASPIDIUM Swz. (See p. 236).

*Asp. biserratum* Swz. Trinidad, J. H. Hart (as *Nephrolepis acuta*).

Var. *Paraense* (Willd.) n. comb., *Asp. Paraense* Willd. More or less hairy beneath on the rachis and surface. Brazil, Mrs. Webb. No. 308 (as *Nephrol. acuta* Presl.)

Var. *furcans* (Hort. ex Bailey) n. comb., *Nephrolepis biserrata* var. *furcans* Hort. ex Bailey. A cultivated plant. Henshaw, July 3, 1880.

*Asp. cordifolium* (L.) Swz., var. *pectinatum* (Willd.) n. comb., *Asp. pectinatum* Willd.; *Nephrolepis occidentalis* Kze. Hayti, Yaeger No. 128 without date.

*Asp. exaltatum* (L.) Swz. Eustis, Fla., G. V. Nash, No. 1888. Sandwich Islands, Heller, No. 1987. Yungas, Bolivia, Rusby No. 411 (two sheets) and Bang No. 291. Brazil, Mrs. Webb, No. 240.

## SACCOLOMA Klf.

*Sac. elegans* Klf. Bolivia, Rusby No. 156.

*Sac. inaequale* (Kze.) Mett. Nassau, New Providence, Bahamas, Mrs. Webb No. 248, 1870. Not included in Britton and Millspough's Bahama Flora.

## DIELLIA Brack.

*Diel. Alexandri* (Hillb.) Diels. Sandwich Islands, Dr. A. B. Lyons, 1877.

*Diel. falcata* Brack. Sandwich Islands, Dr. A. B. Lyons, 1877.

## DAVALLIA Sm.

*Dava. dubia* R. Br. Ringwood, Victoria, A. Morrison, Dec. 8, 1887.

*Dava. membranulosa* Wall. Near Askat, India, J. F. Duthie, Aug. 14, 1886.

*Dava. pulchra* Don. Kali Valley, India, J. F. Duthie No. 6299, July 24, 1886.

Var. *Pseudocystopteris* (Kze.) Duthie. *Dava. Pseudocystopteris* Kze. Kumaun, India, J. R. Reid, No. 6278, July 1, 1886.

## SCYPHOFILIX Thouars. (See p. 237).

*Scy. trrigosa* (Thumb.) (*Trichomanes strigosum* Thunb.) var. *hirta* (Klf.) n. comb., *Davallia hirta* Klf. Sandwich Islands, Dr. A. B. Lyons, 1877; Mrs. Gulick, without date.

*Scy. Speluncae* (Linn.) n. comb., *Polypodium Speluncae* Linn. I refer here a sterile frond, or rather the upper part of one, collected in New Granada, Triana No. 201.

Var. *Jamaicensis* (Hk.) n. comb., *Davallia Jamaicensis* Hk. Sandwich Islands, Dr. A. B. Lyons 1862 and 1867 (two sheets).

## STENOLOMA Fée. (See p. 237).

*S. Chinensis* (L.) Bedd. Ceylon, Wight No. 141 (without name); Mts. Nilghiri, and Kurg, India, G. Thompson (as *Davallia tenuifolia* Swz.); all three plants on 1 sheet. The fronds are narrowly oblong and the segments are prevailing rounded.

Var. *tenuifolia* (Swz.) n. comb., *Davallia tenuifolia* Swz. The fronds are ovate or deltoid-ovate and the segments are prevailing truncated. Sandwich Islands: Dr. A. B. Lyons, 1860; Mrs. Gulick without date.

## TAPEINIDIUM (Pr.) C. Chr.

*Tap. pinnatum* (Cav.) C. Chr. Java, Kallman (without date as *Davallia flagillifera* Wall.).

## DENNSTAEDTIA Bernh.

*Denn. Adiantoides* (H. & B.) Moore. Brazil, Mrs. Webb No. 340.

*Denn. Cicutaria* (Swz.) Moore. Brazil, Mrs. Webb Nos. 260 and 285.

Var. *tenera* (Presl.) n. comb., *Dicksonia tenera* Presl. Brazil, Mrs. Webb, No. 259.

*Denn. dissecta* (Swz.) Moore. Bolivia, Bang, No. 2423.

*Denn. punctilobula* (Mx.) Moore. S. E. Anderson, July. (no other data).

*Denn. rubiginosa* (Klf.) Moore. Brazil, Mrs. Webb, No. 251.

LINDSAEA Dry. ex Sm. *Lindsaya* authors.

Dryander named this genus after John Lindsay of Jamaica. In Latinizing "Lindsay" Dryander chose *Lindsaea* as the proper Latin spelling. Under the International Rules Dryander's spelling cannot be changed.

*Lindsaea Guianensis* (Aubl.) Dry., var. *major* Hk. Guatemala, Tuerckheim No. 830 (two sheets).

*Lindsaea lancea* (L.) n. comb. (*Lindsaea trapeziformis* Dry.; *Adiantum lanceum*, Linn.; *Lindsaya lancea* (L., Bedd.) Bolivia, Rusby No. 161 (as *L. trapeziformis* Dry.).

*Lindsaea linearis* Swz. Oakleigh, Victoria, J. H. Morrison, March 12, 1885.

*Lindsaea stricta* (Swz.) Dry. Bolivia, Bang No. 905.

## ODONTOLOMA J. Sm.

*Od. repens* (Bory) Presl, var. *Macraeana* (Hook. and Arn.) n. comb. *Davallia Macraeana* Hk. and Arn. Sandwich Islands, Dr. A. B. Lyons.

## ATHYRIUM Roth. (See pp. 237-238).

*Ath. Acrostichoides* (Swz.) Diels. Rochester, Michigan, Farwell No. 4582b, Sept. 12, 1917; No. 4676, Oct. 7, 1917; No. 5193, Oct. 10, 1918. One sheet without data (as *Asplenium Thelypteroides*).



Var. *Allantodioides* (Bedd.) n. comb., *Asplenium Thelypteroides* var. *Allantodioides* (Bedd.) Baker. Dhauli Valley, India, 10-19,000 ft., J. F. Duthie, No. 6239, Aug. 7, 1886 (as *Asplenium Thelypteroides* Mx.).

*Ath. angustifolium* (Mx.) Milde. Farwell in Michigan: Rochester, No. 4651a, Sept. 27, 1915; near Farmington, No. 6071, Sept. 28, 1921. Ann Arbor, Michigan, Dr. A. B. Lyons, 1868. A. H. Young, Hanover, Ind., July, 1876 (a sterile frond as *Asplenium lanceolatum*). Passaic, N. J., Dr. Rusby, Sept. 1, 1878 (cultivated).

*Ath. Filix-femina* (L.) Roth. Female Fern; Lady Fern. Odense, Denmark, Feilberg, Aug. 1863.

Var. *Asplenioides* (Mx.) Farw. N.w. Ark., Harvey, No. 93. Lake City, Fla., G. V. Nash, No. 2236 (each as *Aspl. Filix-femina* Bernh.).

Var. *Californicum* Butters. Mogollon Mts., Dr. Rusby, Aug. 1881 (as *Aspl. Filix-femina* Bernh.).

Var. *fissidens* Doell. I would refer to this variety Rusby's Bolivian collection No. 395 (as *Asplenium Filix-femina* Bernh.).

Var. *multidentatum* Doell. Preszburg, Hungary, K. Richter, 1883 (as *Aspidium Filix-femina* Swz.).

Var. *Sitchense* Rupr. Oregon, Mrs. Summers (as *Aspidium spinulosum* var. *dilatatum*).

Var. *tenuifrons* (Wall.) n. comb., *Asplenium tenuifrons* Wall. Rachis and midribs covered beneath with small spines or strigillae. Birch forests in western Nepal, 12-13000 ft., J. F. Duthie, No. 6304, July 27, 1886 (two sheets as *Asplenium Filix-femina*).

Var. *commune* D. C. E. Ferns, N. Amer. II, 227, f. 5. (*A. angustum* var. *rubellum* (Gilbert) Butters as to the green stemmed plants). Farwell in Mich.: Utica, No. 6077a, Oct. 5, 1921; Oxford, No. 6120, Oct. 12, 1921; Newport, No. 6226, July 5, 1922; a small form approaching var. *exile* (D. C. E.) n. comb. (*Aspl. Filix-femina* var. *exile* D. C. E., l.c., f.9.) which is a small form, 6 inches or less high, having the pinnae

incised or cut, the narrow lobes two or three toothed at the apex. Staten Island, N. L. Britton, 1882.

Forma *rubellum* (Gilbert) Farwell. *Asplenium Filix-foemina* D. C. E., Ferns N. Amer. II (1880) 225, Pl. 76, f.1. This has the stems and rachises red. Rochester, Mich., Farwell, No. 5185, Oct. 6, 1918, and No. 6125, Oct. 19, 1921.

Subvar. *elegans* (Gilb.) Farwell. Farwell in Michigan: Oxford, No. 6119, Oct. 12, 1921; Utica, No. 6079, Oct. 5, 1921. New York, O. E. Pearce, 1885.

Var. *Michauxii* (Mett.) Clute. *Aspidium angustum* Willd., *Asplenium Filix-foemina* var. *angustum* D. C. E., l.c., 227, f.7. Open woods near Farmington, Mich., Farwell. No. 6068, Sept. 28, 1921. East Greenwich, N. Y., Dr. Asa Fitch, 1867. Rocky fields, Clifton, Mich., Farwell, No. 7768, Aug. 11, 1926= (No. 590 from the same region).

Subvar. *clatius* (Link) Farwell. Goodison, Mich., Farwell No. 5374, Sept. 4, 1919.

*Athy. fimbriatum* (Wall.) Moore. Sora, India, J. F. Duthie, July 13, 1886, No. 6225.

*Athy. Poiretianum* (Gaud.) Presl. Sandwich Islands, Dr. A. B. Lyons, 1875 and 1877 (two sheets as *Aspl. multisectum* Brack. and as *Aspl. Aspidioides* Schlecht.).

*Athy. Schimperii* Mougl. Dhauli Valley, India, 9-10,000 ft., J. F. Duthie, No. 6306, Aug. 7, 1886 (as *Asplenium Schimperii*).

DEPARIA Hook. and Grev.

*D. prolifera* (Klf.) Hk. and Grev. Sandwich Islands, Mrs. Gulick.

DIPLAZIUM Swz.

*Dipl. ambiguum* Raddi. Yungas, Bolivia, Rusby No. 386 (as *Aspl. radicans* Schk.). Under this number are "two pinnae of a large frond." But one evidently is *Dipl. Shepherdii*.

*Dipl. Arnottii* Brack. Sandwich Islands, Mrs. Gulick (1 sheet as *Aspl. microsorum* and 1 sheet as *Aspl. cocularium*).

*Dipl. expansum* Willd. Brazil, Mrs. Webb No. 321 (3 sheets as *Aspl. radicans* Schk.) and No. 242 (as *Aspl. caudatum?*).

*Dipl. Franconis* Liebm. Guatemala, Tuerckheim No. 636 (2 sheets as *Asplenium*).

*Dipl. Klotschii* (Mett.) Moore. Yungas, Bolivia, Rusby No. 394 and Mapiri, 2,500 ft. without number, May, 1886.

*Dipl. Sandwichianum* (Presl) Diels. Sandwich Islands: Dr. A. B. Lyons 1862 and 1867 (two sheets as *Aspl. brevissorum* Baker); Mrs. Gulick (a portion of a sterile frond as *Asplenium Sandwichianum*).

*Dipl. Shepherdii* (Spr.) Link. Brazil, Mrs. Webb No. 266. Bolivia, Rusby No. 386 in part.

*Dipl. striatum* (L.) Pr. var. *bipinnatisectum* (Griseb.) n. comb., *Dipl. amplum* Liebm., *Aspl. striatum* var. *bipinnatisectum* Griseb. Bolivia, Rusby No. 387 (as *Aspl. crenulatum* Baker). The fronds are bipinnate, the pinnules pinnatifid.

#### HEMIDICTIONYUM Presl.

*H. marginatum* (L.) Presl. Triniçad without data (as *Hymenophyllum marginatum* Linn.). Brazil, Mrs. Webb No. 312, (as *Asplenium*).

#### PHYLLITIS Hill. (See p. 238).

*Phy. nigripes* (Fée) O.K. Guatemala, Tuerckheim No. 633 (as *Scolopendrium nigripes*).

*Phy. Scolopendrium* (L.) Newm. Hart's Tongue. Onondago Co., New York (Pursh's station) Mrs. M. O. Rust and Chittenango Creek, W. N. Y., John Towey without date. Wellburg near Tegernsee, Bavaria, C. J. Mayer, July 1886 (2 sheets). Pyrenees, Mrs. Webb, Aug. 1871.

#### CAMPTOSORUS Link. Walking Fern.

*C. rhizophyllum* (L.) Link. Norway, Mich., C. F. Wheeler, Aug. 27, 1892. Swartzwood Lake, N. J., Dr. Rusby, Aug. 1879. Little Falls, N. J., Dr. Rusby, Oct. 3, 1891. Shelburne, Mass., Miss S. E. Anderson. Arkansas, Harvey No. 88.

#### NEOTTOPTERIS J. Sm. Birds Nest Fern. (See p. 239.)

*N. Nidus* (L.) J. Sm. Oahu, Sandwich Islands, Dr. A. B. Lyons, 1875.

ASPLENium (Tourn.) Linn. Scale Fern.

*Ceterach* Adans. p. p.; Lam. *Asplenium* authors (See p. 239).

*A. Ceterach* Linn. Near Bristol, Somerset Co., Eng., H. Fisher, 1882. Mt. Valere, Sion, Switzerland, Loher, Aug. 29, 1887. Pyrenees Mts., Mrs. Webb. Prov. Como, Italy, Pastor Mueller.

CHAMAEFILIX Hill. Spleenwort. (See pp. 239, 240.)

Sect. *Neottopteridastrum* (Fée, as sect. of *Asplenium*) n. comb. Fronds simple, elongated (*Asplenium serratum* Linn.).

*Ch. serrata* (L.) n. comb., *Aspl. serratum* Linn. Everglades, Fla., A. H. Curtiss, No. 3717\*, January.

Var. *crenulata* (Pr.) n. comb., *Aspl. crenulatum* Presl. Margins of frond crenulate instead of sharply serrate as in the specific type. Lower Orinoco, Rusby and Squires, No. 372. Bolivia, Bang No. 1350. Brazil, Mrs. Webb, No. 296 (as *Aspl. Serra* L. & F.).

Sect. *Hemionitidastrum* (Fée as sect. of *Aspl.*) n. comb. Fronds lobed or pinnatifid in the lower half, the upper half undivided. (*Aspl. Hemionitis* Linn. is the type and becomes *Ch. Hemionitis* (L.) n. comb.).

*Ch. pinnatifida* (Nutt.) n. comb., *Aspl. pinnatifida* Nutt. Winston Co., Ala., C. Mohr.

Sect. *Acropteris* n. comb., (Link, as a genus, in small part; Diels as a sect. of *Asplenium*)

Fronds are dichotomous, palmate or pinnate; pinnae 2-5, cuneate, linear or oblong. (Type is *Acrostichum septentrionale* Linn.).

*Ch. Seclosii* (Leyb.) n. comb., *Aspl. Seclosii* Leyb. South Tirol, C. J. Mayer, Sept. 2, 1891.

*Ch. septentrionalis* (Linn.) n. comb., *Acros. septentrionale* Linn. Austria, Keck. Dhauri Valley, India, 11-12,000 ft., J. F. Duthie, No. 6249, Aug. 4, 1886.

Sect. *Euasplenium* n. comb., (Baker, as Sect. under *As-*

*plenium*). Fronds once or more pinnate; pinnae numerous. (*Asplenium marinum* Linn.).

Subsection—*Pinnatae* (Diels) n. comb. Fronds once pinnate. (*Asplenium marinum* Linn.).

Division—*Abbreviatae* n. div. Pinnae relatively short, nearly as broad as long, with or without auricles, not conspicuously dimidate. (*Asplenium Trichomanes* Linn.).

Subdivision—*Virides* (Diels) n. comb. Stipes and rachis slender, green. (*Asplenium viride* Huds.).

*Ch. Trichomanes-dentata* (L.) n. comb. (*Asplenium Trichomanes-dentatum* L., *Aspl. dentatum* L. Jamaica, G. F. Curtis.

*Ch. flabellifolia* (Cav.) n. comb. *Aspl. flabellifolium* Cav. Frankston, Victoria, J. H. Morrison, Feb. 21, 1885.

*Ch. fragilis* (Pr.) n. comb. *Aspl. fragile* Presl. Bolivia: Rusby, Nos. 404 and 405 from Sorata and Unduavi; Bang, No. 121 from LaPaz (2 sheets).

*Ch. Trichomanes-ramosa* (L.) n. comb., *Asplenium Trichomanes-ramosum* Linn., *Aspl. viride* Huds. Mt. Mansfield, Vt., T. Morong, July 10, 1878. Basses Pyrenees, Mrs. Webb, Aug. 1871. Germany, July 1870. Kutti Valley, India, 19,000 ft. J. F. Duthie, Aug. 1, 1886, No. 6251.

Subdiv. *Trichomanes* (Diels) n. comb. Stripes and rachis stout or wiry, blackish or brown, usually polished. (*Asplenium Trichomanes* Linn.).

*Ch. blepharodes* (D.C.E.) (*Aspl. blepharodes* D.C.E.) var. *vespertina* (Max.) n. comb., *Aspl. vespertinum* Maxon. So. Calif., D. Cleveland, March 1883. Poway, Calif., F. E. Blaisdell, 1881 (each as *Aspl. Trichomanes* var. *incisum* Moore).

*Ch. resiliens* (Kze.) n. comb., *Aspl. resiliens* Kze.; *Aspl. parvulum* Mart. and Gal.; (non Wall. which is *Aspl. varians* Wall ex Hk. and Grev.= *Ch. parvula* (Wall.) n. comb.). N. w. Ark., Harvey No. 90. Alabama, Mohr. Guatemala, Tuerckheim No. 714.

*Ch. monanthes* (L.) n. comb., *Aspl. monanthes* Linn. New Granada, Triana No. 196 (as *Aspl. monanthemum*).

*Ch. platyneuros* (L.) n. comb., *Acrostichum platyneuron*

Linn. Franklin, N. J., Rusby, Aug. 1874. N. w. Ark., Harvey No. 89.

Var. *serrata* (E. S. Miller) n. comb., *Aspl. ebenum* var. *serratum* E. S. Miller, *Aspl. platyneuron* var. *serratum* (E. S. Mill.) B. S. P. Eustis, Fla., G. V. Nash No. 1138.

*Ch. extensa* (Fée) n. comb., *Aspl. extensum* Fée. Unduavi, Bolivia, 10,000 ft., Rusby No. 407, Oct. 1885. This plant is too large and coarse to be *Aspl. Trichomanes* as published; it is a pendent plant and is the *Aspl. extensum* Fée as distributed.

*Ch. Trichomanes* (L.) n. comb., *Aspl. Trichomanes* Linn. Shelburne, Mass., Miss S. E. Anderson, July 14, 1873. N. w. Ark., Harvey No. 91. Havdrup near Solo, Denmark, John Lange, May 14, 1846. Dhuali Valley, India, 5 - 6000 ft., J. F. Duthie, No. 6250, Aug. 1886. I can see no difference in these plants from three continents.

Division *Acutae*, n. div. Pinnae numerous, oblong to linear, acute or acuminate, mostly large herbaceous; veins distinct. (*Asplenium Salicifolium* Linn.).

Subdivision - *Salignae* n. subdiv. Pinnae about equal on both sides at the base. (*Asplenium salignum* Bl. = *Chamaefilix saligna* (Bl.) n. comb.)

*Ch. alata* (H. & B.) n. comb., *Aspl. alatum* H. & B. ex Willd. Guatemala, Tuerckheim No. 573 (two sheets).

*Ch. oligophylla* (Klf.) n. comb., *Aspl. oligophyllum* Klf. Bolivia, Rusby No. 383 (two sheets). Brazil, Mrs. Webb, No. 297.

Subdivision *Salicifoliae* n. subdiv. Pinnae auricled at the base on the upper side, the inner edge of the auricle more or less parallel with the rachis; the lower side at the base more or less obliquely truncate. (*Asplenium Salicifolium* Linn.).

*Ch. cirrhatum* (Rich.) n. comb., *Aspl. cirrhatum* Rich., *Aspl. radicans* Authors non Linn. according to Maxon. Guatemala, Tuerckheim No. 631 (two sheets).

*Ch. lunulata* (Swz.) n. comb., *Aspl. lunulatum* Swz. Pinnae oblong, obtuse. Brazil, Mrs. Webb No. 238 and No. 324

in part. Bolivia, Bang Nos. 2285 and 2419. Sandwich Islands, Dr. A. B. Lyons, 1877.

Var. *erecta* (Bory) n. comb., *Aspl. erectum* Bory ex Willd. Pinnae lanceolate, acute or acuminate. Brazil, Mrs. Webb, No. 324 in part.

Var. *harpeodes* (Kze.) n. comb., *Aspl. harpeodes* Kze. Similar to var. *erecta* but the pinnae are incised or laciniate. Bolivia: Rusby No. 399; Bang No. 2233. Brazil, Mrs. Webb, No. 323.

Var. *pteropus* (Kaulf.) n. comb., *Aspl. pteropus* Klf. This variety has the rachis narrowly winged. Bolivia: Rusby No. 401 (as *Aspl. monanthemum* L., var. *Menziesii* Hk.) and No. 403.

*Ch. obtusifolia* (Linn.). (*Aspl. obtusifolium* Linn.) var. *riparia* (Liebm.) n. comb., *Aspl. riparium* Liebm. Brazil, Mrs. Webb No. 354.

*Ch. Salicifolia* (L.) n. comb., *Aspl. Salicifolium* Linn., *Aspl. auriculatum* Swz. according to Maxon. Bolivia, Rusby, No. 397.

Subdivision *Resectae* n. subdiv. Pinnae prominently auricled on the upper side at the base; on the lower side dimidiate, often more than half the lower side cut away. (*Asplenium unilaterale* Lam.).

*Ch. formosa* (Willd.) n. comb., *Aspl. formosum* Willd. Nassau, New Providence, Bahamas, Mrs. J. W. Webb, No. 326, 1870. Not included in Britton and Millspaugh's Bahama Flora.

*Ch. unilateralis* (Lam.) n. comb., *Aspl. unilaterale* Lam., *Aspl. resectum* Sm. Sandwich Islands, Dr. A. B. Lyons, 1875.

Division *Vulgares* n. subdiv. Pinnae thick, often coriaceous; veins frequently hidden or obscure. (*Asplenium marinum* Linn.).

Subdivision *Genuinae* n. subdiv. Pinnae at base about equal on each side or nearly so. (*Asplenium marinum* Linn.).

*Ch. enata* (Brack.) n. comb., *Aspl. enatum* Brack. Sandwich Islands, Dr. A. B. Lyons, 1875.

*Ch. Kaulfussii* (Schlecht.) (*Aspl. Kaulfussii* Schlecht.)

var. *Darcooides* (Hillb.) n. comb., *Aspl. Kaulfussii* var. *Darcooides* Hillb. Pinnae acuminate, the apex obtuse, pinnatifid into cuneate-obovate segments 2-5 toothed at the apex. Sandwich Islands, Dr. A. B. Lyons, 1877 (as *Aspl. flaccidum* Forst.).

Subdivision *Cordatae* n. subdiv. Pinnae equal on each side at base, sessile, cordate. Not represented in the Parke, Davis & Co. Herbarium. The type is *Asplenium laxum* Raddi non R. Br. = *Chamaefilix laxa* (Raddi) n. comb. (*Asplenium mucronatum* Presl).

Subdivision *Falcatae* n. subdiv. Pinnae auricled on the upper side at the base, generally falcate; veins numerous and close placed, making a small angle with the midrib. The type is *Asplenium Adiantoides* Linn.; *Aspl. falcatum* Lam. = *Ch. Adiantoides* (Linn.) n. comb.

*Ch. erosa* (Linn.) n. comb., *Aspl. erosum* Linn.; Guatemala, Tuerckheim, No. 635 (two sheets as *Aspl. auritum* Swz. forma *typica*).

Var. *serrata* (Aubl.) n. comb., *Aspl. auritum* Swz., var. *serratum* (Aubl.) Baker. Brazil, Mrs. Webb, No. 339 in part and No. 288 (a proliferous bud with 4 small fronds as *Aspl. auritum* var. *proliferum*).

Var. *sulcata* (Lam.) n. comb., *Aspl. auritum* Swz., var. *sulcatum* (Lam.) Baker. Brazil, Mrs. Webb No. 339 in part. Bolivia: Rusby No. 391; Bang No. 2251. All of these were distributed as *Aspl. auritum* var. *rigidum* Swz.).

*Ch. horrida* (Klf.) n. comb., *Aspl. horridum* Klf. Sandwich Islands, Dr. A. B. Lyons, 1877.

*Ch. lobulata* (Mett.) n. comb., *Aspl. lobulatum* Mett. Sandwich Islands, Dr. A. B. Lyons, 1862 (pinnae are pinnatifid).

*Ch. pseudofalcata* (Hillb.) n. comb., *Aspl. pseudofalcatum* Hillb. Sandwich Islands, Dr. A. B. Lyons, 1862. Pinnae undivided. Both of these last two species are represented on one sheet as *Aspl. falcatum* Lam.?

*Ch. Serra* (Langs. and Fisch.) n. comb., *Aspl. Serra* Langs.



and Fisch. Bolivia, Rusby No. 384 (two sheets). New Grenada, Triana, No. 197.

Var. *Imrayuna* (Hk.) n. comb., *Aspl. Serra* var. *Imrayanum* Hk. Bolivia, Rusby No. 388 (as *Aspl. falcatum* Lam.).

Subsect. *Compositae* (Diels) n. comb. Fronds twice or more pinnate. (*Asplenium Adiantum-nigrum* Linn.).

Division *Cuneatae* (Diels) n. comb. Fronds coriaceous, ultimate segments cuneate, linear or oval; lowest pinnae usually the longest. (*Asplenium Adiantum-nigrum* Linn.).

Subdivision *Rutae-murariae* n. subdiv. Pinnae not auricled or but slightly so. (*Asplenium Ruta-muraria* Linn.).

*Ch. Bradleyi* (D. C. E.) n. comb., *Aspl. Bradleyi* D. C. E. N. w. Ark., Harvey No. 92 and No. 90 in part.

*Ch. Ruta-muraria* (L.) n. comb., *Aspl. Ruta-muraria* Linn., *Aspl. cryptolepis* Fernald. Pyrenees, Mrs. Webb, 1871. Kentucky without other data, A. Cuthbert.

Var. *Pseudogermanica* (Heufler) n. comb., *Aspl. Ruta-muraria* var. *Pseudogermanicum* Heufler. Basses Pyrenees, Mrs. Webb, Aug. 1871 (as *Aspl. Germanicum*).

Var. *lanceola* (Christ.) n. comb., *Aspl. Ruta-muraria* var. *lanceolum* Christ., *Aspl. cryptolepis* var. *Ohionis* Fernald. Hanover, Ind., A. H. Young, July 1876.

*Ch. montana* (Willd.) n. comb., *Aspl. montanum* Willd. Shawangunk Mts., N. Y., Dr. Rusby, Sept. 4, 1892. Harper's Ferry, W. Va., G. Guttenberg, Aug. 1878.

Subdivision *Adianti-nigri* n. subdiv. Pinnae strongly auricled. (*Asplenium Adiantum-nigrum* Linn.).

*Ch. Adiantum-nigrum* (L.) n. comb., *Aspl. Adiantum-nigrum* Linn. Pyrenees, Mrs. Webb, Aug. 1871. Sandwich Islands, Dr. A. B. Lyons, 1877. Dr. Lyons' plant is on the sheet with var. *acuta*. Doubtless both were collected in order to show the variations as they constitute parts of the same collection distributed as *Aspl. Adiantum-nigrum* Linn.

Var. *acuta* (Bory) n. comb., *Aspl. Onopteris* Linn., *Aspl. acuta* Bory. In so far as I am able to ascertain *acuta* is the oldest variatal name used for this variation of the species. Sandwich Islands, Dr. A. B. Lyons, 1877.

Var. *incisa* (Tausch.) n. comb., *Aspl. Serpentine* and var. *incisum* Tausch. *Aspl. incisum* Opiz., *Aspl. Adiantum-nigrum* var. *Serpentine* (Tausch.) Koch. Riesengebirge, Germany, J. Ostermaier, Aug. 1892.

Var. *Silesiaca* (Milde) n. comb., *Aspl. Silesiacum* Milde. Sandwich Islands, Dr. A. B. Lyons, 1880 (as *Aspl. Adiantum-nigrum* L., var. *Sandwichianum* Hk.).

*Ch. fragrans* (Swz.) n. comb., *Aspl. fragrans* Swz. Brazil, Mrs. Webb Nos. 291 (as *Aspl. auritum*) and 290 (as *Aspl. auritum* v. *rigidum*).

Var. *Foeniculacea* (HBK.) n. comb., *Aspl. auritum* var. *Foeniculaceum* (HBK.) Baker. Bolivia: Rusby No. 392; Bang No. 662. Guatemala, Tuerckheim No. 634 (two sheets).

*Ch. filaris* (Forsk.) n. comb., *Aerostichum filare* Forsk. (1775). *Aspl. praemorsum* Swz. (1788). *Aspl. Adiantoides* Lam. (1786) [non *Trichomanes Adiantoides* Linn. (1753) which is *Ch. Adiantoides* (Linn.) n. comb.] *Aspl. furcatum* Thurb. Bolivia, Bang No. 2138. Brazil, Mrs. Webb No. 359. New Granada, Triana No. 198.

Division *Lanceolatae* (Diels) n. comb. Fronds 4-8 inches long, lanceolate, herbaceous for the most part, veins pinnate. (*Asplenium lanceolatum* Huds. = *Ch. lanceolata* (Huds.) n. comb.)

Subdivision *Communes* n. subdiv. Lower pinnae are not conspicuously reduced. Not represented in P. D. & Co.'s herbarium. The typical species is *Ch. lanceolata* (Huds.).

Subdivision *Fontanae* n. subdiv. The lower pinnae are conspicuously reduced in size. (*Asplenium fontanum* (Linn.) Bernh.)

*Ch. fontana* (L.) n. comb., *Polypodium fontanum* Linn. Villaneuve, Switzerland, Mrs. Webb No. 376.

Var. *Halleri* (Roth) n. var., *Athyrium Halleri* Roth., *Aspl. fontanum* var. *Halleri* Duthie. Kutte Valley, India, 10-11,000 ft., J. F. Duthie No. 6246, July 29, 1886.

*Ch. gracilis* (Fourn.) n. comb., *Athyrium gracile* Fourn., *Aspl. Glenniei* Baker. Chihuahua, Mex., C. G. Pringle No. 833, November 4, 1886.

Division *Bulbiferae* (Diels) n. comb. Fronds herbaceous, rarely membranaceous, generally over a foot in length; veins pinnate. Fronds apt to be proliferous or rooting at the apex. (*Asplenium bulbiferum* Forst.).

Subdivision *Sessiles* n. subdiv. Pinnules sessile, sometimes with a narrowed petiole like base. (*Asplenium bulbiferum* Forst.).

*Ch. bulbifera* (Forst.) n. comb., *Aspl. bulbiferum* Forst. Strezelecki Ranges, Gippsland, Victoria; C. French, Jr., 1894.

*Ch. cristatum* (Lam.) n. comb., *Aspl. cristatum* Lam. Lower Orinoco, Rusby and Squires, No. 118, May 1896 (as *Aspl. Cicutarium* Swz.).

*Ch. Gibertiana* (Hk.) n. comb., *Aspl. Gibertianum* Hk. Paraguay, T. Morong No. 739, 1888-'90.

*Ch. rhizophylla* (Sm.) n. comb., *Caenopteris rhizophylla* Sm., *Aspl. Macraei* Hk. and Grev. Sandwich Islands: Dr. A. B. Lyons, 1877 (as *A. Macraei* Hk. and Grev.); also 1880 (without name of collector as *A. Macraeanum* Hk. and Grev.).

Subdivision *Petiolatae* n. subdiv. Pinnules petiolate. (*Asplenium rhizophorum* Swz. non L.).

*Ch. delicatula* (Pr.) n. comb., *Aspl. delicatulum* Presl. Bolivia, Rusby No. 393.

*Ch. rhizophora* (Swz.) n. comb., *Aspl. rhizophorum* Swz. non Linn., *Aspl. flabellulatum* Kze. Brazil, Mrs. Webb No. 329 (as *Aspl. rhizophorum* Swz.).

*Ch. myriophylla* (Swz.) n. comb., *Caenopteris myriophylla* Swz. Guatemala, Tuerckheim No. 829 (as *Aspl. rhizophyllum* Kze.).

*Ch. Scandicina* (Klf.) n. comb., *Aspl. Scandicinum* Klf. Brazil, Mrs. Webb No. 342.

*Ch. uniseriale* (Raddi) n. comb., *Aspl. uniseriale* and *A. rachirhizon* Raddi. Bolivia: Yungas, 6,000 ft., Rusby No. 389, 1885; Mapiri, 2,500 ft., Dr. Rusby, May 1886 without number; (each as *Aspl. rhizophorum* Linn.). New Granada, Triana No. 199, (as *Asplenium flavellatum*).

BLECHNUM Linn. (See p. 240.)

*Blechnum auriculatum* Cav. Chile, Dr. Rusby No. 303 (as *B. hastatum* Klf.).

*B. Blechnoides* (Lag.) C. Chr. Bolivia, Dr. Rusby, No. 302, No. 305 and No. 307 and Brazil, Mrs. Webb, No. 272 (all as *B. unilaterale*).

*B. Brasiliense* Desv. Cult. at Patterson, N. J., E. D. Shaw.

*B. lanceola* Swz. Cult. Hort. Bot. Lips.

*B. longifolium* H. & B. ex Willd. Bolivia, Dr. Rusby No. 304 in part.

Var. *Fraxincum* (Willd.) Baker. Bolivia, Dr. Rusby No. 304 in part.

Var. *gracile* (Klf.) Baker. Brazil, Mrs. Webb, No. 357.

*B. nigrosquamatum* Gilbert. Bolivia, Bang No. 2314.

*B. occidentale* Linn. Brazil: Mrs. Webb, 1867, 1868, (two sheets); L. C. Branner without other data. Cult. Hort. Duval Cartigry, July 23, 1826; in horto quodam Arglico, 1832.

Var. *pectinatum* (Hk.) n. comb., *B. pectinatum* Hk. Bolivia, Bang Nos. 241 and 1594.

Var. *campylote* (Kze.) n. comb., *Lomaria campylotis* Kze. Bolivia, Dr. Rusby No. 309. Guatemala, Tuerckheim No. 638 (2 sheets).

*B. serrulatum* Rich. Saw Fern. Fla.: Nash No. 884; Mary C. Reynolds, St. Augustine 1876 and 187-.

SALPICHLAENA J. Sm. (See p. 240.)

*Sal. volubilis* (Klf.) J. Sm. Brazil, Mrs. Webb, No. 314, 1867-8.

LONCHITIS-ASPERA Hill. (See p. 240.)

*La. Capensis* (L.) n. comb., *Osmunda Capensis* Linn., *Blechnum Capense* (L.) Schlecht. Frankston, Victoria, A. Morrison, Feb. 22, 1888 (2 sheets).

Var. *Chilensis* (Klf.) n. comb., *Lomaria Chilensis* Klf. Chile, Dr. Rusby, No. 310 (2 sheets as *L. procera* Spreng.).

Var. *procera* (Forst.) n. comb., *Osmunda procera* Forst.

Bolivia, Dr. Rusby No. 311 (2 sheets). Brazil, Mrs. Webb, No. 281 and 294.

Var. *striata* (Swz.) n. comb., *Onoclea striata* Swz., *Lomaria* Willd. Bot. Gard. Trinidad without data.

*La. discolor* (Forst.) n. comb., *Osmunda discolor* Forst. Dandenong Range, Victoria, A. Morrisor, March 7, 1871.

*La. Féei* (Jenm.) n. comb., *Lomaria Féei* Jenm. Bolivia, Bang, No. 2317.

*La. L'Herminieri* (Bory) n. comb., *Lomaria L'Herminieri* Bory. Brazil, Mrs. Webb, No. 356 (as *Acrostichum serrulatum*). Bot. Gard. of Trinidad without data.

*La. Meridensis* (Kl.) n. comb., *Lomaria Meridensis* Kl. Bolivia, Dr. Rusby, No. 314 (as *Lom. attenuata*).

*La. Penna-marina* (Poir.) n. comb., *Polypodium Penna-marina* Poir. Bolivia, Dr. Rusby No. 316. Brazil, Mrs. Webb, No. 367 (both as *Lom. alpina* Spr.).

*La. Plumieri* (Desv.) n. comb., *Lomaria Plumieri* Desv. Bolivia, Dr. Rusby, No. 318 (2 sheets).

*La Polypodioides* (Swz.) n. comb., *Osmunda Polypodioides* Swz. Bolivia: Dr. Rusby No. 315 (as *Blechnum Asplenoides* Swz.); Bang No. 435 (1 sheet as *Bl. Asplenoides* Swz. and 2 sheets of *Lomaria Onocloides* Spr.). All the specimens are sterile fronds and agree with the description of the sterile frond of this species.

*La. Spicant* (Linn.) n. comb., *Osmunda Spicant* Linn., *Blechnum* Swz., *Lomaria* Desv. Deer Fern. Oregon, L. F. Henderson, July 13, 1882. 1 sheet without data. Pyrenees, Mrs. Webb, August 1871. St. Leger, France, Gmelch, 1869.

Var. *serrata* (Woll.) n. comb., *Blechnum Spicant* L. *serratum* Woll. Some of the pinnae of the sterile frond are more or less irregularly serrate. Oregon, Howell, Aug. 1880.

*La. tabularis* (Thunb.) n. comb., *Pteris tabularis* Thunb., *Lom. Magellanica* Desv. Falkland Islands, Mrs. Webb, Nos. 328 and 366 (as *Lomaria Boryana* Willd.).

Var. *Saligna* n. var. Sterile frond up to 2 or 2.5 feet long, oblong, up to 5 or 6 inches wide in the middle and more or less tapering each way, pinnate; stipes up to 8 inches in length,

these, the rachis and midnerves of the pinnae more or less covered with long brown scales; pinnae oblong-linear, entire, 2-4 inches long, up to 0.5 inch wide, obtuse, cuneate at base and petiolulate, the terminal with two or three small alternate lunate lobes at its base on each side. Otherwise as in the species. Bolivia: Mapiri 10,000 ft., April 1886, Dr. Rusby, No. 313 (2 sheets); Yungas, Bang No. 663, 1890 (both as *Lomaria Boryana*).

SADLERIA Klf.

*S. Cyatheoides* Klf. Oahu, Sandwich Islands, Dr. Lyons, 1862.

*S. pallida* Hk. and Arn. Hawaii, Sandwich Islands, Dr. Lyons, 1875.

ANCHISTEA Pr. Chain Fern.

*A. Virginica* (L.) Pr. Mich.: Lakeville, Farwell, No. 5314; Bloomfield, Farwell, No. 4205 and 4397. Florida: H. D. Keeler without other data; Eustis, Nash, No. 658. T. F. Allen without data.

WOODWARDIA Sm. Chain Fern.

*W. radicans* (L.) Sm., var. *spinulosa* (Mart. and Gal.) Fée. San Diego, Texas, Miss Croft, 1885. Calif.: Long Valley, Dr. A. Kellogg, July 7, 1869; San Lui Obispo Co., Mrs. R. W. Summers, July 1884. Mt. Diablo Base, W. P. Gibbons, No. 458/c, 1874. Texas is not usually included in the range of this species; Arizona and Nevada are the only inland states that have been recorded as within its range.

LORINSERIA Pr. Chain Fern.

*L. areolata* (L.) Pr., *Onoclea nodulosa* Mx. Franklin, N. J., H. H. Rusby, Aug. 1875. Augusta, Ga., A. Cuthbert, Aug., 1876. N. w. Ark., Harvey, No. 87. Eustis, Fla., Nash, No. 1636. Shady woods, Mpt. Oct. 75, without other data.

## DOODYA R. Br.

*D. aspera* R. Br. Frankston, Victoria, A. Morrison, March 2, 1889.

## ANOGRAMMA. (See p. 241).

*A. leptophylla* (L.) Link. Insula Ischia, Mary F. Spencer, May 14, 1896. Insel Pantellaria, Mary F. Spencer, Feb. 6, 1894. (Both as *Grammitis leptophyllum*).

## LEPTOGRAMMA J. Sm.

Veins free, sori elongated, otherwise like *Phegopteris*. A segggregate from *Gymnogramma*.

*L. Aspidioides* (Willd.) Kl. Brazil, Mrs. Webb, No. 269 (as *Gymnogramma Asplenoides*).

*L. striatum* (L.) Pr., var. *grandis* (Baker) n. comb., *Gymnogramma grandis* Baker. Bolivia, Rusby, No. 147.

*L. Polypodioides* (Raddi) J. Sm. Brazil, Mrs. Webb, No. 327 (as *G. Polypodioides*).

## GYMNOGRAMMA Desv. (See pp. 240-241).

*Gym. elongata* Hk. and Grev. Bolivia, Rusby, No. 329. (as *Gym. angustifrons* Baker).

*Gyn. flexuosa* (Hb. and Bon.) Desv. Bolivia: Rusby, N. 128 (2 sheets); Bang, Nos. 661 and 2238. New Granada, Triana, No. 186.

*Gym. myriophylla*, Swz. Brazil, Mrs. Webb, No. 349.

## JAMESONIA Hook and Grev.

*J. imbricata* (Cav.) Hk. and Grev. Bolivia, Dr. Rusby No. 141.

## BOMMERIA Fourn.

*B. Ehrenbergiana* (Kl.) Undw. Mexico, Schaffner No. 32, Oct. 1875 (as *Gymnogramma*).

*B. hispida* (Mett.) Undw. Clifton, Ariz., Dr. Rusby, No. A, Feb. 1881.

PITYROGRAMMA Link (1833).

(*Ceropteris* Link, 1841) (See p. 241).

*Pit. Calomelanos* (L.) Britt. and Millsp. (*P. Calomela* Link). Bolivia, Rusby, Nos. 131, 134, 148 (2 sheets). Mezapia Valley, Venezuela, without other data (as *Gymnogramme lastrum* Desv.).

Var. *Austroamericana* (Domin.) n. comb., *Ceropteris Austroamericana* Domin. Bolivia, Bang, No. 244.

Var. *chrysophylla* (Swz.) n. comb., *Gymnogramme chrysophyllum* (Swz.) Klf. Bolivia, Dr. Rusby, No. 130.

Var. *Peruviana* (Desv.) n. comb., *Gymnogramma Peruviana* Desv. Brazil, Mrs. Webb, No. 295.

*Pit. sulphurea* (Swz.) Maxon. Jamaica, G. F. Curtis without data.

*Pit. Tartarea* (Cav.) Maxon. Bolivia: Unduavi, Rusby, No. 132; Yungas, Bang, No. 305.

Var. *ochracea* (Pr.) n. comb., *Gymnogramme ochracea* Pr. Brazil, Mrs. Webb, No. 282 (as *Gym. Tartarea* Desv.).

Var. *Ornithopteris* (Klf.) n. comb., *Gymnogramme Ornithopteris* Klf. Bolivia, Rusby, No. 133.

*Pit. triangularis* (Klf.) Maxon. Calif.: Geo. Thurber (without other data); San Diego Co., F. E. Blaisdell, 1880; San Luis Obispo Co., Mrs. Summers, 1884. N. Lower Cal., C. R. Orcutt, May 22.

Var. *viscosa* (Nutt.) n. comb., *Gymnogramme viscosa* Nutt. ex D. C. E. Povay, Calif., F. E. Blaisdell, 1881; San Luis Obispo Co., Calif., Mrs. Summers, June, 1883.

TRISMERIA Fée. (See p. 241.)

*T. trifoliata* (L.) Diels. Guanai, Bolivia, Rusby, No. 146 (2 sheets), 2,000 ft., May 1886 (as *Gymnogramme trifoliata*).

CASSEBEERA Klf. (See pp. 242-243.)

*C. Andromedaefolia* (Klf.) n. comb., *Pteris Andromedaefolia* Klf., *Pellaea* Fée. San Diego Co., Calif., Wm. Stout, April 1, 1878 (as *Pel. intermedia*). N. Lower Calif., C. R. Orcutt, May 27, 1881.



Var. *gracilis* (Mrs. Summers) n. comb., *Pellaea Andromedaefolia* var. *gracilis* Mrs. Summers in herb. Low, under 8 inches in height, slender, most of the pinnules linear, 2-3 lines long. San Luis Obispo Co., Calif., Mrs. R. W. Summers.

Var. *pubescens* (Nutt.) n. comb., *Cheilanthes pubescens* Nutt. San Luis Obispo Co., Calif., Mrs. Summers.

Var. *rubens* (Eaton) n. comb., *Pel. Andromedaefolia* var. *rubens* Eaton. Placer Co., Calif., C. S. Osborne, March 3, 1881 and San Diego Co., Calif., F. E. Blaisdell, 1881 (both as *Pel. intermedia*). San Luis Obispo Co., Calif., Mrs. Summers, April 1884 (as *Pel. Andromedaefolia*).

*C. Arseni* (Christ.) n. comb., *Pel. Arseni* Christ. Mexico, E. Palmer, 1885 (as *Cheilanthes microphylla*).

*C. aspera* (Hk.) n. comb., *Cheilanthes aspera* Hk. Mexico, C. G. Pringle, Oct. 1885.

*C. atropurpurea* (L.) n. comb., *Pteris atropurpurea* Linn. Burro Mts., N. Mex., H. H. Rusby, No. K, July, 1880. A sheet without data. Shoreham, Vt., E. Brainerd, July 11, 1878.

Var. *minima* (Egg.) n. comb., *Pel. atropurpurea* var. *minima* Eggert in herb. Plant small, under three inches, once pinnate, the lower pair of pinnae being hastately three lobed. Rocks near St. Louis, Mo., H. Eggert, July 1878.

Var. *glabella* (Mett) n. comb., *Pel. glabella* Mett. Dayton, O., A. P. Morgan.

*C. cordata* (Cav.) n. comb., *Pteris cordata* Cav. Mexico, Wilkinson, Aug. 1885.

*C. intermedia* (Mett.) n. comb., *Pel. intermedia* Mett. Burro Mts., N. Mex., H. H. Rusby, No. N., 1880.

*C. marginata* (H. B. K.) n. comb., *Chei. marginata* HBK. Sorata, Bolivia, Rusby No. 328. Chihuahua, Mex., Pringle No. 832, October 1886. New Granada, Triana, No. 206.

*C. pulchella* (M. & G.) n. comb., *Allosorus pulchellus* Mart. and Gal. Mexico, Wilkinson, 1885.

*C. Seemanni* (HK.) n. comb., *Pel. Seemanni* Hk. Mexico, J. G. Schaffer, No. 97, Sept. 1875.

*C. ternifolia* (Cav.) n. comb., *Pt. ternifolia* Cav. La Paz, Bolivia, Rusby No. 323. Chihuahua, Mexico, E. Palmer No.

452, Aug. to Nov. 1885. Sandwich Islands, Dr. A. B. Lyons, 1862 and 1877.

*Var. Ornithopus* (Hk.) n. comb., *Pel. Ornithopus* Hk. San Luis Obispo Co., Cal., Mrs. Summers, June 1883.

*Var. stipitata* n. var. Most of the pinnae and pinnules distant from each other and conspicuously stipitate. San Diego Co., Cal., F. E. Blaisdell, 1881.

*Var. mucronata* (Eaton) n. comb., *Allosorus mucronatus* Eaton. *Pel. Wrightiana* Hk. Burro Mts. N. Mex., Rusby No. L, Sept. 1880.

*Var. longimucronata* (Hk.) n. comb., *Pel. longimucronata* Hk. Burro Mts., N. Mex., Rusby No. M, Sept. 1880 (2 sheets).

*C. viridis* (Forsk.) n. comb., *Pt. viridis* Forsk. Cult. at Passaic, N. J., H. H. Rusby (as *Pel. hastata*).

DORYOPTERIS J. Sm. (See p. 243).

*Dory. decipiens* (Hk.) J. Sm. Oahu, Sandwich Islands, Dr. Lyons, 1862. Hawaiian Islands, Dr. Lyons, 1877.

*Dory. elegans* (Vell.) Christ. Brazil, Mrs. Webb, No. 353.

*Dory. pedata* (L.) Fée. Bolivia: Rusby No. 112; Bang No. 212. Brazil, Mrs. Webb, Nos. 258 and 275. Bolivia, Rusby No. 135 (Mulford Expedition) (as *Gymnopteris tomentosa* Underw.).

*Var. palmata* (Willd.) n. comb., *Pteris palmata* Willd. Brazil, Mrs. Webb, No. 276.

*Dory. saggitifolia* (Raddi) J. Sm. Brazil, Mrs. Webb, No. 317.

ADIANTOPSIS Fée.

*Ad. chlorophylla* (Swz.) Fée. Brazil, Mrs. Webb, No. 267.

*Ad. radiata* (L.) Fée. Brazil: Mrs. Webb, No. 330 and J. C. Branner without data. Paraguay, Morang, No. 569.

NOTHOLAENA R. Br.

*N. Aschenborniana* Kl. Mexico: Mexico, J. G. Schaffner, No. 43; Mts. of Chihuahua, C. J. Pringle, March 27, 1883.

*N. Bonariensis* (W.) C. Christ. A new name for *N. fer-*

*ruginea* Klf. Bolivia, Rusby Nos. 332, 335, 336. New Granada, Triana No. 205. San Angel, Mex., Schaffner, No. 35, Sept. 1875.

*N. Grayi* Dav. Clifton, Ariz., Rusby No. G, Feb. 1881.

*N. Marantae* (L.) R. Br. Kauri Pass, India, J. F. Duthie No. 5187 (a).

*N. Newberryi* Eaton. San Diego Co., Calif., F. E. Blaisdell, 1881. N. Lower Calif., C. R. Orcutt, April 17.

*N. nivea* (Poir.) Desv. Bolivia, Rusby No. 324 and Bang, No. 19, 1889, near La Paz, 10,000 ft.

Var. *dealbata* (Ph.) Dav. N. w Ark., Harvey, No. 80.

Var. *Mexicana* (Max.) n. comb., *N. limitanea* ssp. *Mexicana* Max. Burro Mts., N. Mex., Rusby, No. D., Sept. 1880.

Var. *tenera* (Gill.) n. comb., *N. tenera* Gill. ex Hk. Bolivia, Rusby No. 326.

*N. Parryi* Eaton. San Diego Co., Calif., Wm. Stout, April, 1878.

*N. sinuata* (Lag.) Klf. Pinnae, ovate or oblong, entire or crenately lobed, small, about 5 lines long. Bear Mts., N. Mex., Rusby No. B, Oct. 10, 1880.

Var. *pinnatifida* n. var. Pinnae broadly oval, up to 10 lines long, pinnatifid. Bear Mts., N. Mex., Rusby No. B 1, Oct., 1880.

The white, stellate scales on the upper surface of the pinnae of this species gradually disappear and the upper surface becomes glabrate or entirely glabrous (*N. laevis* M. & G.; var. *integra* Liebm.); the cinnamon scales on the under surface become white with age and old fronds with white scales on the underside of the pinnae are *N. pruinosa* Fée or var. *pruinosa* (Fée) Fourn.

*N. sulphurea* (Cav.) J. Sm., var. *accessita* (Jeps.) n. comb., *N. candida* Hk.; *N. candida* var. *accessita* Jeps. Mexico, E. Palmer, Aug. 1885 (as *N. candida* Hook.).

Var. *Californica* (D. C. E.) n. comb., *N. Californica* D. C. E. S. Calif., D. Cleveland, March, 1878. St. Thomas, Lower Calif., C. R. Orcutt, April 13.

Var. *quinquefidopalmata* (Hk.) n. comb., *N. Hookeri* D. C.  
E. Burro Mts., N. Mex., Rusby No. C, Sept. 1880.

ALLOSORUS Bernh. (1806). (See p. 243).

Sect. *Eucheilanthes* (Baker) n. comb.; *Cheilanthes*  
Sect. *Eucheilanthes* Baker; *Pellaea* Sect. *Allosorus* Baker, in  
part.

*All. Alabamensis* (Buckl.) O. K. N. w. Ark., Harvey No.  
100.

*All. albomarginatus* (Clarke) n. comb., *Chei. albomargi-  
nata* Clarke. India at an altitude of 8-9,000 ft., J. R. Reid,  
No. 6267, July 1886.

*All. fragrans* (Linn.). (*Polypodium fragrans* Linn., Mant.  
non Sp. Pl.; *Allosorus pusillus* Bernh.) var. *odorus* (Swz.) n.  
comb., *Chei. odora* Swz.. *A. fragrans* the type of the genus,  
is not represented in the Herbarium of Parke, Davis & Co.  
except by its var. *odorus*; Syra (Greek Island) without other  
data. Sicily, Mary F. Spencer, Jan. 14, 1894.

*All. lanosus* (Mx.) O. A. F. Nashville, Tenn., G. W. Hub-  
bard, 1879 and N. w. Ark., Harvey, No. 81 (both as *Cheilan-  
thes vestita* Swz.).

*All. microphyllus* (Swz.) Liebm., var. *elongata* (Willd.)  
n. comb., *Cheil. elongata* Willd. ex Klf. Central Paraguay,  
Morong, No. 232, 1888-1890 (as *Cheil. microphylla* var. *elon-  
gata* Willd.).

*All. pilosus* (Goldm.) n. comb., *Chei. pilosa* Goldm. Bo-  
livia, Rusby Nos. 330 and 331.

*All. pruinatus* (Klf.) n. comb., *Chei. pruinata* Klf. Bo-  
livia, Rusby No. 320 and Bang No. 1056 (each as *Chei. Mat-  
thewsii* Kze.).

*All. subvillosus* (Hk.) n. comb., *Chei. subvillosa* Hk.  
Dhaul Valley, 8-9,000 ft., Nepaul, Duthie, No. 6291, Aug. 8,  
1886.

*All. Wrightii* (Hk.) n. comb., *Chei. Wrightii* Hk. Clifton,  
Arizona, Rusby No. F, Feb. 1881.

Sect. *Physapteris* (Pr.) n. comb., *Cheilanthes* Sect.  
*Physapteris* Presl.

*All. Cooperae* (D. C. E.) n. comb., *Cheil. Cooperae* D. C. E. So. Calif., D. Cleveland, April 1880.

*All. gracillimus* (D. C. E.) n. comb., *Cheil. gracillima* D. C. E. W. Klickitat Co., Wash., Suksdorf, June 7, 1881. Plumas Co., Calif., Mrs. R. W. Austin, 1876.

*All. lendiger* (Cav.) n. comb., *Pteris lendigera* Cav. New Granada, Triana No. 193.

Var. *minor* (M. & G.) n. comb., *Cheil. minor* Mart. & Gal. The frond in the var. is longer and narrower (linear-lanceolate) with smaller and rounder segments. San Angel, Mexico, Schaffner, No. 47, 1875 (as *Cheil. Clevelandii*).

*All. Lindheimeri* (Hk.) n. comb., *Cheil. Lindheimeri* Hk. Burro Mts., N. Mex., Rusby No. J., Sept. 1880.

Var. *Eatoni* (Baker) n. comb., *Cheil. Eatoni* Baker. The scales on the rachises of the frond on the under side seem to indicate its relationship to this species rather than to *A. tomentosus*. Burro Mts., N. Mex., Rusby No. H. Sept. 1880. Chihuahua, Mex., Pringle No. 454, Oct. 19, 1885.

*All. myriophyllus* (Desv.) n. comb., *Cheil. myriophylla* Desv. Bolivia, Rusby No. 322 and Bang No. 751. Cantilles Mts., n. Lower Calif., C. R. Orcut, Sept. 8. San Augustin de las Cuevas, Mexico, Schaffner, No. 52, Sept. 1875.

Var. *Clevelandi* (D. C. E.) n. comb., *Cheil. Clevelandii* D. C. E. So. Calif., D. Cleveland, June 1880. San Diego Co., Calif., F. E. Blaisdell, 1881.

Var. *Covillei* (Max.) n. comb., *Cheil. Covillei* Max. Clifton, Ariz., Mar. 1881, (Rusby without a number).

Var. *elegans* (Desv.) n. comb., *Cheil. elegans* Desv. Chihuahua, Mex., Pringle, No. 829, Oct. 16, 1886.

Var. *Fendleri* (Hk.) n. comb., *Cheil. Fendleri* Hk. Burro Mts., N. Mex., Rusby, No. H 1, Sept. 1880 (4 sheets).

Var. *Wootoni* (Max.) n. comb., *Cheil. Wootoni* Max. Burro Mts., N. Mex., Rusby, No. H 1, Sept. 1880.

*All. Pringlei* (Dav.) n. comb., *Cheil. Pringlei* Davp. Mex., E. Palmer, Aug. 1885.

*All. tomentosus* (Link) O. A. F. Blount Co., Ala., C.

Mohr, June 1, 1882. N. w. Ark., Harvey No. 83. Western N. C., James Galen, No. 3687, Aug. 1881.

*All. vestitus* (Hk.) n. comb., *Cheil. vestita* Hk. non Swz. *A. gracilis* (Fée O. A. F. *Cheil. lanuginosa* Nutt. Burro Mts., N. Mex., Rusby No. G., Oct. 1880. Arizona, Aug. 1872 (without other data). N. w. Ark., Harvey, No. 82.

*All. viscidus* (Davp.) n. comb., *Cheil. viscida* Davp. So. Calif., D. Cleveland, March 1880.

Sect. *Aleuritopteris* (Fée) n. comb., *Aleuritopteris* Fée. *Cheilanthes* Sect. *Aleuritopteris* (Fée) Baker.

*All. farinosus* (Forsk.) n. comb., *Pteris farinosa* Forsk. India, Miss M. Anderson, 1876.

Var. *Dalhousiae* (Hk.) n. comb., *Cheil. Dalhousiae* Hk. Opposite Budhi—, 11,000 ft., India, Duthie, No. 6263, July 18, 1886.

#### HYPOLEPIS Bernh.

*Hy. Californica* (Nutt.) Hk. San Diego Co., Calif., F. E. Blaisdell, 1881. St. Thomas, n. Lower California, C. R. Orcutt.

*Hy. repens* (L.) Pr. Bolivia, Rusby No. 410, Brazil, Mrs. Webb, Nos. 318 and 364.

Var. *inermis* Hk. Brazil, Mrs. Webb, No. 252.

#### CRYPTOGRAMMA R. Br.

*C. crispa* (L.) R. Br. Cumberland, Eng., C. Bailey, Sept. 18, 1882. Ullswater, Eng., Mrs. Webb, June 1871. Represented in North America by f. *Americana* Hk. Isle Royale, Dr. A. B. Lyons, 1860. Mt. Hesperus, Colo., Baker, Earle and Tracy, No. 245, June 30, 1898. W. Klickitat Co., Wash., Suksdorf, June 7, 1882.

*C. densa* (Brack.) Diels. This species has been placed at one time or another in *Cassebeera* (*Pellaea*) or *Allosorus* (*Cheilanthes*); but it seems to be a true dimorphic *Cryptogramma* and more closely related to *C. crispa* than it could ever be to *Hypolepis Californica* with which some prefer to associate it under *Cheilanthes*. It probably is only a variety

of *C. crispa* with chestnut colored stalks and may be appropriately named *Cryptogramma crispa* var. *Castanea* n. var. The segments of the sterile frond are linear-lanceolate and sharply serrate. W. Klickitat Co., Wash., Süksdorf, June 11, 1881. E. Oregon, T. J. Howell, May, 1880.

*C. Stelleri* (Gmel.) Prantl. Willoughby Mt., Vt., Rusby, July 23, 1892. S. E. Anderson, July 1874 without locality.

ADIANTUM Linn. Maiden Hair Ferns.

Group—*Radicantes* Baker.

*Ad. lunulatum* Burm. (without data).

Group *Polysori* (us Baker).

*Ad. cristatum* Linn. Brazil, Mrs. Webb, No. 298. Wright, Parry and Brummel, Jan. - Mar., 1877 (without locality).

*Ad. intermedium* Swz. Columbia, Dr. R. P. Stevens, 1869. Brazil, Mrs. Webb, No. 265.

*Ad. obliquum* Willd. Bolivia, Bang, No. 1440.

*Ad. polyphyllum* Willd. Brazil, Mrs. Webb, No. 344.

*Ad. tetraphyllum* Humb. and Bonp. From the Trinidad Bot. Gard. without data.

Var. *fructuosum* (Poepp.) n. comb., *Ad. fructuosum* Poepp. ex Kze. Bolivia, Bang No. 2284.

*Ad. trapeziforme* L. Brazil, Mrs. Webb, Nos. 299 and 369.

*Ad. serrato-dentatum* Willd. Columbia, R. P. Stevens, in 1869 (without place or name). Brazil, Mrs. Webb, No. 292 (as *Ad. obtusum*).

Var. *Kunzei* (Miq.) n. comb., *Ad. Kunzei* Miq. Bolivia, Rusby (Mulford Expedition) No. 567 (as *Ad. petiolatum* Desv.). Three fronds on the sheet: one, a small one is typical *Ad. serrato-dentatum*; and the others are var. *Kunzei*, distinguishable only by its broader and larger pinnules. The stipe is pubescent like the rachis; in *Ad. petiolatum* it is naked and polished.

Group *Oligosori* (us Baker).

*Ad. deltoideum* Swz. Jamaica, G. F. Curtis, (without other data).

*Ad. pulverulentum* Linn. Jamaica, G. F. Curtis (without other data).

Group—*Capilli-Veneris* (us Baker).

*Ad. Aethiopicum* Linn. Oakleigh, Victoria, J. H. Morrison, October 25, 1886. Cult. at the Royal Bot. Garden at Dresden, 1878.

*Ad. Capillus-Veneris* Linn. N. w. Ark. Harvey No. 86. Texas: H. H. Heller, No. 1939; J. Reverchon, June 1, 1880. Hawaiian Islands, Dr. A. B. Lyons, 1877.

Var. *emarginatum* (Bory.) n. comb., *Ad. emarginatum* Bory. The pinnules are less divided and the margins are finely crenate or entire. Bolivia, Bang No. 1771.

*Ad. emarginatum* Hook. (*Ad. Jordani* K. Muell.) Calif.: San Diego Co., F. E. Blaisdell, 1881; San Luis Mt., Mrs. Summers, June 1884.

*Ad. Chilense* Kaulf., Conception, Chile (without other data).

*Ad. cuneatum* Langs. and Fisch. Bolivia: Rusby, No. 165; Bang, No. 211. Brazil, Mrs. Webb, No. 270.

*Ad. tenerum* Swz. Jamaica, G. F. Curtis, without other data. Bahamas, Mrs. Webb, No. 239, 1870.

*Ad. tinctum* Moore. Bolivia, Bang No. 112 (as *A. decorum*).

Var. *Wagneri* (Mett.) n. comb., *Ad. Wagneri* Mett. Bolivia: La Paz, Rusby No. 166 (as *Ad. fragile?*); Bang, No. 2064.

*Ad. tricholepis* Fée. Yucatan, Valdez No. 64, 1896.

Group—*Scandentes* Baker.

*Ad. digitatum* Presl. Bolivia: Sorata, Rusby No. 159, Feb. 1886; Bang No. 1779 (without data).

*Ad. flexuosum* Hk. Guatemala, Tuerckheim, No. 711 (as *Ad. Féei* Moore).

Group—*Pedata* (um Baker).

*Ad. hispidulum* Swz. Cult. at Paterson, N. J., Dr. Rusby (?) Cult. on Isle of Wight: at Apley near Ryde, Th.S., Aug. 1850; Garden at St. Johns, Ryde, Aug. 12 1850 as *Ad. pubescens*; (on one sheet).



*Ad. pedatum* Linn. Farmington, Michigan, Farwell, No. 6074, Sept. 28, 1921. Westfield, Mass., H. H. Rusby, June 24, 1873. East Greenwich, N. Y., Dr. Asa Fitch, 1867. N. w. Ark., Harvey No. 85. Opposite Budhi Village, India, J. F. Duthie, No. 6232, July 18, 1886, 11,000 ft.

Var. *myriosorum* (Baker) n. comb., *A. myriosorum* Baker. I would place here a fern from the Jumna Valley near Kharsali, India, 8 - 9,000 ft., collected by J. F. Duthie, Sept. 1883. The main forks are ascending and the branches erect making the fronds rather compact; the sori are round and the indusia are reniform as described by Baker.

ACROPTERIS Link (See p. 243).

*A. dichotoma* (Forsk.) n. comb., *Acrostichum* Forsk. non Linn., *A. radiata* Link., *Asplenium radiatum* Swz. Poona District, August (without other data); Pama (possibly Poona) (without other data).

PTERIS Linn.

(Type species *Pt. longifolia* Linn.). (See pp. 243-244).

Sect. *Eupteris* Baker.

*Pt. cretica* Linn. Aspagala, Fl., Curtiss, No. 3704. Hawaiian Islands, Dr. Lyons, 1877.

*Pt. deflexa* Link. Bolivia, Rusby Nos. 116 and 163. Brazil, Mrs. Webb, No. 261 (2 sheets).

*Pt. excelsa* Gaud. Oahu, Sandwich Islands, Dr. Lyons, 1875. Hawaiian Islands, Dr. Lyons, 1877 (2 sheets).

*Pt. longifolia* Linn. Hort. Bot. Basil, 1846 (2 sheets).

*Pt. multifida* Poir. "Smith's Aquarium" as *Pt. caudata*.

*Pt. quadriaurita* Retz. Guatemala, Tuerckheim No. 522.

Sect. *Litobrochia* (Pr.) Baker.

*Pt. arborea* Linn. Bolivia, Rusby No. 162 (as *Pt. aculeata* Swz.)

*Pt. denticulata* Swz. Bolivia, Rusby, No. 114.

*Pt. gigantea* Willd. Bolivia, Bang No. 1632.

*Pt. Haenkeana* Presl. Brazil, Mrs. Webb, No. 241.

*Pt. podophylla* Swz. Bolivia, Rusby No. 115; Bang, No. 2384.

HISTIOPTERIS (Agardh) J. Sm.

*H. incisa* (Thunb.) J. Sm. Bolivia, Bang, No. 2253.

LONCHITIS Linn.

*L. pubescens* Willd. Bolivia, Rusby No. 145.

FILIX-FOEMINA Hill.

Family Herbal (1755) and in the British Herbal (1756). (*Pteridium* Gledit.) (See pp. 235, 236, 243, 244).

*Ff. aquilina* (L.) n. comb., *Pteris aquilina* Linn. The Common Brake or Bracken. Shelburne, Mass., Miss S. E. Anderson, Aug. 1874.

Var. *arachnoidea* (Klf.) n. comb., *Pteris arachnoidea* Klf., *Pt. aquilina* var. *arachnoidea* Baker. Guatemala, Tuerckheim, No. 843. Brazil, Mrs. Webb, No. 268.

Var. *caudata* (L.) n. comb., *Pteris caudata* Linn. Biscayne Bay, Fla., W. S. Rusby.

Var. *pseudocaudata* (Clute) n. comb., *Pt. aquilina* var. *pseudocaudata* Clute. East Greenwich, N. Y., Dr. Asa Fitch, 1867. Fla.: Biscayne Bay, W. S. Rusby; Eustis, Nash No. 638.

Var. *integerrima* (Moore) n. comb., *Pt. aquilina* var. *integerrima* Moore. The divisions of the 3rd order are linear-oblong, acute, entire, or slightly crenate at the base. Rosenberg, Hungary, Richter, 188 - .

Var. *lanuginosa* (Bong.) n. comb., *Pteris aquilina* L., var. *lanuginosa* Bong. San Luis Obispo Co., Calif., Mrs. Summers, July 1883. Portland, Ore., L. F. Henderson, June 27, 1882.

Var. *pinnatifida* (Warnst.) n. comb., *Pteridium aquilinum* var. *pinnatifidum* (Warnsterf) Asch. and Graeb. Divisions of the 3rd order, linear and acute and for the most part pinnatifid into small, deltoid, acute or obtuse segments. Oahu, Sandwich Islands, Dr. Lyons, 1860.

OETOSIS Necker.

(*Vittaria* Sm.) (See p. 244).

*OEt. elongata* (Swz.) Greene. Oahu, Sandwich Islands, Heller, No. 2054, Apr. 2, 1895.

Var. *rigida* (Klf.) n. comb., *Vit. rigida* Klf., *Vit. plantaginica* Hk. and Grev. One sheet without data.

*OEt. lineata* (L.) Greene. Fla.: St. Augustine, Miss Mary C. Reynolds, 1876 and 187-; Eustis, Nash No. 1503. Hort. Trin., J. H. Harb No. 3898, 1890, (as *Vit. linearis*). Brazil, Mrs. Webb, No. 336.

Var. *filifolia* (Fée) n. comb., *Vit. filifolia* Fée. Guatemala, Tuerckheim, No. 811 (as *Vit. lineata*).

Var. *filiformis* (Cav.) n. comb., *Vit. filiformis* Cav. New Granada, Triana, No. 194 (as *Vit. lineata*).

*OEt. stipitata* (Kunze) n. comb., *Vit. stipitata* Kze. Bolivia: Rusby No. 340; Bang No. 353.

Var. *Williamsii* (Bened.) n. comb., *Vit. Williamsii* Benedict. Bolivia, Rusby No. 339.

CANDOLLEA Mirbel.

(*Pteropsis* Desv. and *Drymoglossum* Presl.) (See pp. 244, 245).

*Cand. heterophylla* (L.) Mirb. *Pteris piloselloides* Linn. Sterile fronds only; Ceylon, N. S. Rudolph, Feb. 1896.

PALTONIUM Presl.

*Pal. lanceolatum* (L.) Presl. Brazil, Mrs. Webb No. 335.

GYMNOPTERIS Bernh. (See p. 241).

*G. tomentosa* (Lam.) Underw. Brazil, Mrs. Webb, No. 346 (as *Gymnogramme tomentosa*).

CONIOGRAMME Fée (See p. 241).

*C. Fraxinea* (Don) Diels, var. *serrulata* (Bl.) Hieron. Hawaiian Islands, Dr. Lyons, 1877 as *Gymnogramma Javanica* Bl.).

**MENISCIUM** Schreb.

*Meniscium reticulatum* (L.) Swz., var. *serratum* (Cav.) n. comb., *Meni. serratum* Cav. Jamaica, G. F. Curtis (as *M. reticulatum* Sw.) Yungas, Bolivia, Bang, No. 554, 1890 (as *M. serratum* Cav.).

Var. *Sorbifolium* (Jacq.) Griseb. Bolivia, Rusby No. 412 (as *M. serratum*). Brazil, Mrs. Webb No. 311.

**GONIOPTERIS** Presl.

The veins are pinnate with the lower contiguous branches joining to form an arch; exindusiate.

*Goni. crenata* (Swz.) Presl. *Lastraea Poiteana* Bory. Trinidad, J. H. Hart, No. 4570 (as *Polypodium crenatum*).

*Goni. prolifera* (Retz) Pr. Chanda District, India, J. F. Duthie No. 10,041, Jan. 18, 1890.

*Goni. radicans* (L.) n. comb., *Asplenium radicans* Linn., *G. reptans* (Gmel.) Presl. Guatemala, Tuerckheim No. 712 b (2 sheets) (as *Polypodium reptans* Swz.)

*Goni. tetragona* (Swz.) Pr. Cuba, Prof. E. H. Day, 1881 (as *Aspidium megalodus* Mett.) (2 sheets).

Var. *megalodus* (Schk.) n. comb., *Polypodium megalodus* Schk. Ex Hort. Trin., J. H. Hart, No. 4734. Venezuela, Dr. R. P. Stevens, 1869 (as *Polypodium tetragonum*).

**PHEGopteris** (Pr.) Fée.

Veins free; exindusiate.

*Pheg. Carrii* (Baker) n. comb., *Polypodium Carrii* Baker. Brazil, Mrs. Webb, No. 247.

*Pheg. caudata* (Raddi) Fée. Brazil, Mrs. Webb, Nos. 320 and 345.

*Pheg. decussata* (L.) Mett. Bolivia, Rusby No. 427. Brazil, Mrs. Webb, No. 307.

*Pheg. Dryopteris* (L.) Fée. Shelburne, Mass., Miss S. E. Anderson, July 1874. New York, O. E. Pearce, June 1881. Vester, Denmark, J. Besalu, Aug. 8, 1879.

Var. *minor* (DC.) n. comb., *Polypodium Dryopteris* var. *minus* DC.; *Pheg. calcarea* Fée; *Pheg. Robertiana* A. Br.

Tirol, 2,000 ft., J. Mayer, July 3, 1892. Pyrenees, Mrs. Webb, Aug. 1871.

*Pheg. grandis* (Pr.) Mett., var. *connexa* (Klf.) n. comb., *Polyp. connexum* Klf. Brazil, Mrs. Webb No. 315 (as *Polyp. connexum* Baker).

Var. *macroptera* (Klf.) n. comb., *Polyp. macropterum* Klf. Brazil, Mrs. Webb No. 350 (as *Pheg. macrosorum* Klf.?).

*Pheg. hexagonoptera* (Mx.) Fée. Michigan: Farwell at Farmington, Nos. 6069 and 8158; Dearborn, No. 5604. Northern New Jersey, Rusby 1879. Conn., Miss S. E. Anderson. 1874. N. w. Ark., Harvey No. 94.

*Pheg. Phegopteris* (L.) Keys. Michigan, Farwell No. 6552. Willoughby, Vt., Rusby, July 25, 1892. Alder Lake, N. Y., Rusby, 1891. Shelburne, Mass., Miss S. E. Anderson, July 16, 1873.

*Pheg. Pteroidea* (Kl.) Mett., var. *Webbæ* n. var. Pinnae 8-24 inches long, 2-4 inches wide at the middle tapering gradually each way, narrowly elliptical, pinnate, 20-60 pinnules on a side, lower pinnules deflexed, lowermost much reduced; pinnules oblong-linear, gradually tapering from a broad base to an acuminate point, 1-2 inches long, 3-7 lines broad at the base, pinnatifid  $\frac{3}{4}$  the way or more to the rachiola with 10-16 segments on a side below the serrate acunination; segments oblong (1-3 lines long) obtuse or acutish, entire, lowest pair longest, the inner side parallel with and appressed to the rachis of the pinna, appearing as stipules to the pinnule; pinnules sessile, pinnae short stalked; veins in the segment pinnate; sori submarginal. The pinnules of *Ph. Pteroidea* are said to be crenate or entire but in these specimens they are very deeply pinnatifid. Near Rio Janeiro and Bahia, Mrs. James Watson Webb, Nos. 351 and 370, 1867-1868 (as *Pheg. Pteroideum*?).

*Pheg. platyphylla* (Willd.) Mett. Bolivia: Rusby No. 414 (as *Asp. aculeatum* Swz.); Bang No. 2319 (as *Pheg. rigida* Hk. and Grev.)

Var. *cochleata* (Kl.) n. comb., *Polyp. cochleatum* Kl. Bolivia, Rusby's collections as follows. Sorata, 10,000 ft. Nos.

415, 416, 420, Feb. 1886; Ingenio del Oro, 10,000 ft. No. 417, March 1886; Near Yungas, No. 418, 4,000 ft. and No. 419, 6,000 ft., 1885 (all as *Aspidium aculeatum*).

Var. *Phegopteroides* (Baker) n. comb., *Aspidium aculeatum* var. *Phegopteroides* Baker, in part. *Polyp. rigidum* Hk. and Grev., *Neph. polyphyllum* Presl. Bolivia, Bang No. 2275.

*Pheg. Rhaetica* (L.) Pérard. (See pp. 237,238). Not represented in P. D. & Co.'s herbarium.

Var. *Americana* (Butters) n. comb., *Athyrium alpestre* (Hoppe) Rylands, var. *Americanum* Butters. Oregon, W. C. Cusick (without other data).

*Pheg. rudis* (Kze.) Bolivia, Bang No. 2315. Also No. 2320 (as *Nephrodium tetragonum* Hk.?).

*Pheg. Sandwicensis* (Hk. and Arn.) Mann. Hawaiian Islands, Dr. Lyons, 1877.

*Pheg. subincisa* (Willd.) Fée. Yungas, Bolivia, 6,000 ft., Rusby Nos. 425 and 426, 1885 (distributed as *Asp. villosum*).

#### GRAMMITIS Swz.

The veins are free, fronds entire and sori oblong. The type species is *Polypodium marginellum* Swz.

*Gram. setigera* (Hk. and Arn.) J. Sm. Hawaiian Islands, Dr. Lyons, 1877. On the same sheet, and probably a part of the same collection, is a rhizome with two fronds that belongs to the allied species *Gram. subspathulata* (Brack.) n. comb. (*Polypodium subspathulatum* Brack.)

*Gram. tenella* Klf. Sandwich Islands: Dr. Lyons, 1862 and 1877; Mrs. Gulick (without other data).

#### XIPHOPTERIS Klf.

The type species is *X. serrulata* (Swz.) Klf. The fronds usually are deeply pinnatifid in whole or in part.

*X. serrulata* (Swz.) Klf. Bolivia: Yungas, 6,000 ft., Rusby No. 369 (two sheets) and Bang No. 561; Guani-Tipuani, Bang No. 1381. Brazil, Mrs. Webb, No. 334. Guatemala, Tuerckheim, No. 13.

## GONIOPHLEBIUM (Bl.) Pr.

The type is *Polypodium cuspidatum* Bl. The veins form regular areolae in the costal region, there being a single simple free vein in each, terminal on which is the sorus. Under surface not or rarely only slightly scaly.

*Go. Brasiliense* (Poir.) n. comb., *Polypodium Brasiliense* Poir. Yungas, Bolivia, Bang No. 362, 1890 (as *Polyp. aureum* Linn. typical).

Var. *Preslianum* (Spr.) n. comb., *Polyp. Preslianum* Spr. Brazil, Mrs. Webb, No. 305.

*Go. Cambricum* (Linn.) n. comb., *Polypodium Cambricum* Linn. Not represented.

Var. *serratum* (Willd.) n. comb., *Polyp. vulgare* var. *serratum* Willd. Not represented.

Var. *Kaulfusii* (D. C. E.) n. comb., *Polyp. Californicum* Klf.; *P. Californicum* var. *Kaulfusii* D. C. E.; *Go. Californicum* Moore. San Luis Obispo Co., Calif., Mrs. Summers, June 1883 (two sheets).

Var. *intermedium* (Hk. and Arn., n. comb., *Polyp. Californicum* var. *intermedium*, D. C. E. San Luis Obispo Co., Calif., Mrs. Summers, May 1883 (two sheets) and June 1884.

*Go. Catherinae* (L. and F.) J. Sm. Brazil, Mrs. Webb, Nos. 255 and 306.

*Go. Fraxinifolium* (Jacq.) Moore. Bolivia, Rusby, No. 346.

*Go. glaucophyllum* (Kze.) Fée. Bolivia: Rusby Nos. 362 and 363; Bang Nos. 437 and 2403.

*Go. loriceum* (L.) J. Sm. Brazil, Mrs. Webb, No. 313.

Var. *Falcaria* (Kze.) n. comb., *Polyp. Falcaria* Kze. Brazil, Mrs. Webb, No. 343 (as *Polyp. repens* Linn.).

Var. *latipes* (L. and F.) n. comb., *Polyp. latipes* Langsd. and Fisch. Bolivia, Bang Nos. 2207 and 2434.

*Go. Meniscifolium* (L. and F.) J. Sm. New Granada, Triana, No. 204 as (*Polyp. Neriifolium* Schk.).

Var. *adnatum* (Kze.) n. comb., *Polyp. adnatum* Kze. Brazil, Mrs. Webb No. 347 (as *P. Neriifolium*).

*Go. Scouleri* (Hk. and Arn.) J. Sm. Tilawook Bay cliffs, Ore., L. F. Henderson, July 18, 1882.

PHLEBODIUM (R. Br.) J. Sm.

The type is *Polypodium aureum* L. Veins forming regular areolae each with two or more free veins, the sorus on their united points, but no sori in the costal rows of areolae.

*Phl. aureum* (L.) J. Sm. S. Fla., Chapman No. 175; Eustis, Fla., Nash No. 1500.

Var. *areolatum* (Humb. and Bp.) n. comb. (*Polyp. areolatum* Humb and Bpl. ex Willd.) Yungas, Bolivia, 6,000 ft., Rusby No. 343.

Var. *pulvinatum* (Link.) n. comb., *Polyp. pulvinatum* Link. San Angel, Mex., Schaffner No. 64, October 1875 (as *Polyp. aureum*).

Var. *trilobatum* (Fée) n. comb., *Chrysopteris trilobata* Fée. Brazil, Mrs. Webb No. 274 (as *Polyp. aureum* var. *areolatum* Eaton).

CAMPYLONEURUM Pr.

The type is *Polypodium Phyllitidis* Linn. The primary veins are distinct from midrib to margin but are connected by parallel, transverse veins which are straight or curved forming regular areolae with two or more sori, the free included veins all directed toward the margin.

*Campy. angustifolium* (Swz.) n. comb., *Polyp. angustifolium* Swz., *Campyloneuron angustifolium* (Swz.) Fée. Bolivia, Bang No. 2234.

Var. *ensifolium* (Willd.) n. comb., *Polyp. ensifolium* Willd. Brazil, Mrs. Webb No. 301 (as *Polyp. angustifolium*). Bolivia, Bang No. 2461 (as *Polyp. angustifolium*).

Var. *solutum* (Kl.) n. comb., *Polyp. solutum* Kl., *Campyloneuron solutum* (Kl.) Fée. Bolivia, Bang No. 1288 (as *Polyp. angustifolium*).

Var. *amphostemon* (Kze.) n. comb., *Polyp. amphostemon* Kze. Bolivia, Rusby No. 350 (as *Polyp. angustifolium*).



*Campy. laevigatum* (Cav.) Presl. Brazil, Mrs. Webb No. 341 (as *Polyp. loriceum*).

*Campy. Phyllitidis* (L.) Presl. Bolivia, Bang Nos. 2395 and 2462.

Var. *costatum* (Kze.) n. comb., *Campy. costatum* (Kze.) Presl. S. Florida, Mary C. Reynolds, April, 1878.

Var. *latum* (Moore) n. comb., *Campy. latum* Moore. Indian River Narrows, Fla., A. H. Curtiss, No. 3668, Sept.

PLEOPELTIS Hb. and Bp. ex Willd. (*Phymatodes* Pr.)

Type species is *Pl. angustum* Hb and Bp. Areolae, numerous, fine, irregular, the included veinlets spreading in all directions. Mostly epiphytes with creeping rhizomes.

*Pl. angusta* Humb. and Bonp., var. *stenoloma* (Fée) n. comb., *Drynaria stenoloma* Fée. Guatemala, Tuerckheim No. 23 (as *Polyp. angustum*).

*Pl. Juglandifolia* (Don) Moore. India, J. F. Duthie, No. 6295, Aug. 23, '86, 6 - 7,000 ft.

*Pl. lanceolata* (L.) Klf. Chihuahua, Mex., Pringle No. 825, Sept. 10, 1886.

*Pl. linearis* (Thunb.) Moore. Sandwich Islands, Mrs. Gullick.

*Pl. Lycopodioides* (L.) Presl. Brazil, Mrs. Webb No. 368 as *Polypodium Lycopodioides* var. *geminatum* Baker.

Var. *Salicifolia* (Willd.) n. comb., *Pl. Salicifolia* (Willd.) Presl. Grenada without data as *Polypodium Lycopodioides* Linn.

*Pl. percussa* (Cav.) Hk. and Grev. Bolivia: Dr. Rusby No. 347 (in 1885) and No. 482 (Mulford Expedition); Bang No. 2206. Brazil, Mrs. Webb No. 271.

*Pl. simplex* (Swz.) Bedd. Near Sasa, India, J. F. Duthie No. 6292.

PESSOPTERIS Undw. and Max.

*Pess. crassifolia* (L.) Undw. and Max. The blade, broken off at apex and base, is about 32 inches long by 5 inches wide

in the middle, cuneately oblong-lanceolate; the sori are 2 lines in diameter and there are 8-10 in a row between the midrib and margin. Bolivia, Rusby No. 345.

Var. *albopunctatissima* (J. Sm.) n. comb., *Pleuridium albopunctatissimum* J. Sm. The frond is 9 inches long by 1.75 inches wide at the apex, cuneately oblong-obovate, glaucous, white punctate. The sori are 1.5 lines in diameter and 4-7 in a row. Brazil, Mrs. Webb No. 316 (as *Polyp. crassifolium* Linn.).

Var. *angustum* (Fée) n. comb., *Pleuridium angustum* Fée. The blade is narrowly oblong, 18 inches by 2.5 inches thence cuneately tapering into a margined stipe altogether 33 inches in length. The sori are 1 line in diameter and 6-8 in the row. Bolivia, Bang, No. 2142 (as *Polyp. crassifolium* Linn.).

#### MARGINARIA Bory.

The type is *M. ceteraccina* Bory which is *Acrostichum Polypodioides* Linn. and *Polypodium incanum* Swz. The under surface is densely scaly.

Sect. *Goniolepicystis* (Diels) n. comb. Lateral veins anastomosing and forming areolae after the fashion of *Gonio-phlebium*.

Subsect. *Lopholepides* (J. Sm.) n. comb. Fronds dimorphous, entire; rhizome wide creeping.

*Marg. piloselloides* (L.) Presl. Bolivia, Rusby No. 361.

Var. *Cayennensis* (Mett.) n. comb., *Polyp. piloselloides* var. *Cayennense* (Mett.) Baker. *Polyp. ciliatum* Willd. Bolivia, Rusby No. 361 a.

Var. *tecta* (Klf.) n. comb., *Polyp. piloselloides* var. *tectum* (Klf.) Baker. Brazil, Mrs. Webb, No. 337 (as *Polyp. piloselloides* var. *aurisetum* Raddi).

Subsect. *Lepicystes* (J. Sm.) n. comb. Fronds not dimorphous, pinnate.

Group—*Genuinnæ* n. nom. Lower pinnae little or not at all reduced.

*Marg. Polypodioides* (L.) Tidest. This species is the group type. N. w. Ark., Harvey No. 79. Augusta, Ga., A.

Cuthbert, June 1876. Eustis, Fla., Nash No. 876. Alta Vera Pass, Guatemala, Tuerckheim, Aug. 1885 (as *Polypodium lepidopteris* (Kze.). (See p. 245.)

Var. *squalida* (Vell.) n. comb., *Polyp. incanum* var. *squalidum* (Vell.) Baker. Bolivia, Rusby No. 134 (Mulford Expedition as *Polyp. Polypodioides*).

Var. *Burchellii* (Baker) n. comb., *Polyp. incanum* var. *Burchellii* Baker. Brazil, Mrs. Webb No. 243 (as *Polyp. incanum*).

*Marg. Thysanolepis* (A. Br.) n. comb., *Polyp. Thysanolepis* A. Br. San Angel, Mex., Schaffner, No. 63, September, 1875. Bolivia, Rusby No. 344.

Group *Lepidopterides* n. nom. The lower pinnae are greatly reduced.

*Marg. lepidopteris* (L. and F.) n. comb., *Polyp. lepidopteris* (L. and F.) Kze. Brazil, Mrs. Webb Nos. 256 and 365. Type species of this group.

Sect. *Micropteris* (J. Sm.) n. comb. Veins free.

Subsect. *Pinnatae* (Diels) n. comb. Fronds pinnate.

Group — *Plebeiae*. Fronds uniform.

*Marg. plebeja* (Schl. and Cham.) n. comb., *Polyp. Plebejum* Schl. and Cham. Guatemala, Tuerckheim, No. 641 (2 sheets).

Var. *Rusbyi* (Max.) n. comb., *Polyp. Rusbyi* Max. Bolivia, Rusby Nos. 353 and 355; the former no. from Yungas 6,000 ft., 1885 and the latter from Unduavi, 8,000 ft., Oct. 1885.

*Marg. subvestita* (Max.) n. comb., *Polyp. subvestitum* Max. Bolivia: La Paz, Rusby No. 365 and Bang, No. 122; Bang No. 2598 without data.

Group *Leucostictae* n. nom. Fronds more or less dimorphous. The type will be *Marg. leucosticta* (Kze.) n. comb. (*Polypodium leucosticton* Kze.).

*Marg. leucosticta* (Kze.) O. A. F. var. *Pleopeltidis* (Fée) n. comb., *Polyp. Pleopeltides* Fée. Sterile and fertile fronds of about the same general outline, about one half as broad as long, the former with a much shorter stipe; the sterile pinnae 3 - 5 lines wide, oblong; the fertile pinnae linear, less than

2 lines wide, the large oval sori close placed and overhanging the margin giving to the pinna a moniliform appearance. Unduavi, Bolivia, 8,000 ft., Rusby No. 364, Oct. 1885.

Subsect. *Compositae* (Diels) n. comb. Fronds twice or more pinnate.

*Marg. Lindeniana* (Kze.) n. comb., *Polyp. Lindeniana* Kze. Guatemala, Tuerckheim No. 1 (as *Polyp. Friedrichsthaliana* Kze.).

POLYPODIUM Linn. Polypody; Rock Brake.

Type species is *Polypodium vulgare* Linn. of Europe.

*Polyp. apiculatum* Kze. Bolivia, Rusby, No. 372.

*Polyp. cultratum* Willd. Yungas, Bolivia, 6,000 ft., Dr. Rusby, No. 374, 1885 (as *P. suspensum* L.) (2 sheets).

Var. *reclinatum* (Brack.) Baker. From Trinidad (as *P. suspensum*) without date.

*Polyp. elasticum* Rich. Bolivia. Dr. Rusby No. 366 from Mapiri and No. 367 from Yungas; Bang No. 2927 without data. All as *P. pumila* H. B. K.

Var. *Filicula* (Klf.) Baker. Bolivia; Bang, No. 1448, without name, from Guani-Tipuani. Brazil; Mrs. Webb No. 352 (as *P. apiculatum* Kze.).

Var. *Glaziovii* Baker. Brazil, Mrs. Webb, No. 300 (as *P. pectinatum* L.).

*Polyp. Hymenophylloides* Klf. On trees in the Hawaiian Islands, Dr. A. B. Lyons, 1877.

*Polyp. Jubaeforme* Klf. Trinidad, R. V. Sherrig, without data.

*Polyp. lepostomum* Fée. Guatemala, Tuerckheim, No. 53 (as *P. pilosissimum* Mart. et. Gaert.). On the same sheet and as part of the same collection is *Polyp. rigens* Max.

*Polyp. moniliforme* Lag. Bolivia, Dr. Rusby No. 381 from Unduavi. New Granada, Triana No. 203.

*Polyp. pectinatum* Linn. Florida: A. H. Curtiss, No. 3661\* from Hillsboro; Nash No. 2264 from Eustis. Bolivia: Dr. Rusby No. 357 from Yungas (as *P. loriceum* L.) and No.

358 from Unduavi. Brazil, Mrs. Webb, No. 286 (as *P. elasticum* Rich.).

Var. *Paradiseae* (L. and F.) Baker. Bolivia, Dr. Rusby No. 356 from Mapiri (as *P. pectinatum* L.) and Bang No. 2228 without data (as *P. pectinatum* L.).

*Polyp. pellucidum* Klf. Hawaiian Islands, Dr. Lyons, 1877.

Var. *opacum* Hillebr. Sandwich Islands, Mrs. Gulick (as *P. pellucidum*).

*Polyp. pendulum* Swz., var. *subsessile* (Baker) Baker. Bolivia: Dr. Rusby No. 379 from La Paz and No. 380 from Mapiri; Bang No. 557 from Yungas. All as *P. subsessile* Baker.

*Polyp. rigens* Max. See *P. leptostomum*.

*Polyp. sarmentosum* Brack. Hawaiian Islands, Dr. Lyons, 1877.

*Polyp. suspensum* L. Bolivia, Dr. Rusby No. 376 from Yungas.

*Polyp. Tamariscinum* Klf. Hawaiian Islands, Dr. Lyons, 1877.

Var. *tripinnatifidum* (Gaud.) Hillbr. Hawaiian Islands, Dr. Lyons, 1877.

*Polyp. vulgare* Linn. Polypody. Rock Brake. Budapest, Hungary, W. Steinitz.

Var. *occidentale* Hk. In moss on *Acer macrophyllum*. Deer Creek "Yeamill" Co., Oregon, Mrs. R. W. Summers, June 1879. On mossy fir trees, Coats Mts., Oregon, Mrs. R. W. Summers, July 1878. Both as *P. falcatum* Kell.

Var. *Virginianum* (L.) Eaton. Rocky cliffs at Grand Ledge, Mich., Farwell No. 6551, June 10, 1923. Shelburne, Mass., Miss S. E. Anderson, July 1874. East Greenwich, N. Y., Dr. Asa Fitch, 1865. Washington Co., Ark., F. L. Harvey No. 77. A sheet without data. All but the first as *P. vulgare*.

PYRRHOSIA Mirbel. (*Cyclophorus* Desv.) (See pp. 245, 246).

*Pyrrhosia varia* (Klf.) n. comb., *Nipholobolus varius* Klf. Probably belonging here are specimens from rocks in mountains at Hongkong collected by C. Wright, 1853-'6 (as *N. Lingua* Spreng.). *Pyr. Lingua* is quite a different species from these plants.

ELAPHOGLOSSUM Schott.

*Ela. Burchellii* (Baker) C. Chr. Bolivia, Dr. Rusby No. 298 from Yungas (as *Acrostichum flaccidum* Fée).

*Ela. conforme* (Swz.) Schott. Mapiro, Bolivia, No. 300 (as *Acrostichum conforme* Swz.).

*Ela. cuspidatum* (Willd.) Moore. Bolivia; Dr. Rusby No. 293 from Unduavi and No. 294 from Yungas. (No. 293 as *Acrostichum cuspidatum* Willd. and No. 294 as *Acr. perelegans*?).

*Ela. Eatonianum* (E. Britt.) C. Chr. Yungas, Bolivia, Dr. Rusby No. 342 (as *Acr. Eatonianum* n. sp.).

*Ela. Gorgoneum* (Kaulf.) Brack. Sandwich Islands, Mrs. Gulick (as *Acr. Gorgoneum*?).

Var. *obtusa* (Fée) n. comb., *Aconiopteris obtusa* Fée. Hawaiian Islands, Dr. Lyons 1877 (as *Acr. Gorgoneum* Klf.).

*Ela. hybridum* (Bory) Moore, var. *melanopus* (Kze.) n. comb., *Acrostichum melanopus* Kze. Yungas, Bolivia, Dr. Rusby No. 292 (as *Acr. melanopus* Kze.).

*Ela. latifolium* (Swz.) J. Sm. Yungas, Bolivia, Dr. Rusby No. 296 (as *Acr. latifolium*).

Var. *longifolium* (Jacq.) n. comb., *Acrostichum longifolium* Jacq. Trinidad without data (as *Aro. latifolium*).

*Ela. Mathewsii* (Fée) Moore. Unduavi, Bolivia, Dr. Rusby No. 297 (as *Acr. Mathewsii* Fée).

*Ela. perelegans* (Fée) Moore. Yungas, Bolivia, Bang No. 434 (as *Acro. latifolium* Swz.) and No. 2602 without data (as *Acro. tectum* Willd.).

*Ela. petiolatum* (Swz.) Urb. var. *minus* (Moore) n. comb., *Acrostichum viscosum* var. *minus* Moore. *Acr. tenuiculum*

Fée. *Ela. tenuiculum* (Fée) Moore. Near Yungas, Bolivia, Dr. Rusby No. 299.

*Ela. squamipes* (Hk.) Moore. Bolivia, Bang No. 1791 without data (as *Acros. squamipes* Hook.).

*Ela. squamosum* (Swz.) J. Sm., var. *micans* (Mett.) n. comb., *Acrostichum manicans* Mett. One sheet without data but probably collection of Dr. Lyons from Hawaiian Islands in 1877.

ACROSTICHUM Linn. Leather Fern.

*Acro. aureum* Linn. Indian River, Florida, A. H. Curtiss, No. 3660.

POLYBOTRYA Humb. and Bonp.

*P. Filiculifolia* (Linn.) n. comb., *Osmunda Filiculifolia* Linn., *Polybotrya Osmundacea* H. and B. ex Willd. Brazil, Mrs. Webb No. 319 (2 sheets as *Acros. Osmundaceum* Hook.).

LEPTOCHILUS Kaulf. (See p. 241).

*Lept. alienus* (Swz.) C. Chr. Lower Orinoco, Rusby and Squires, No. 380.

ALCICORNIUM Gaud. (*Platynerium* Desv.)

*Alc. Andinum* (Baker) Underw. Guani-Tipuaní, Bolivia, Bang No. 1414.

#### CERATOPTERIDACEAE:

CERATOPTERIS Brong.

*C. Thaliotroides* (L.) Brong. Wight No. 36, without other data.

#### GLEICHENIACEAE:

GLEICHENIA Sm.

*G. circinata* Swz. South of Frankston, Victoria, A. Morrison, Oct. 20, 1889.

## DICRANOPTERIS Bernh.

*Di. bifida* (Willd.) Maxon. New Granada, Triana, No. 195. Guatemala, Turckheim, No. 675. Brazil, Mrs. Webb, No. 309 and No. 257. (The first number as *Gleichenia bifida*, the last number as *G. dichotoma* and the other two as *G. pubescens*).

*Di. dichotoma* (L.) n. comb., *Pteris dichotoma* L. and *Acrostichum furcatum* Linn., *Di. furcata* (L.) Underw. The typical variety is not represented in the P. D. & Co. herbarium.

Var. *pubescens* (H. and B. ex Willd.) n. comb., *Mertensia pubescens* H. and B. Bolivia, Bang No. 2924 (as *Gleichenia pubescens* H. B. K.).

Var. *tomentosa* (Cav.) n. comb., *Mertensia tomentosa* Cav. ex. Swz. Yungas, Bolivia, Bang No. 303 (as *Gleichenia* (*sic*) *pubescens* H. B. K.).

*Di. flexuosa* (Schrader.) Underw. Dr. R. P. Stevens, 1869, Venezuela without place (as *Gleichenia dichotoma*).

*Di. linearis* (Burm.) Underw. Near Askot, India, J. F. Duthie, No. 6280, August 14, 1886, 4 - 5,000 ft. The undersides of the pinnules are glaucous white and the rachides are more or less scaly with cinnamon colored scales.

Var. *viridis* n. var. The undersides of the pinnules are green not glaucous and the rachides are glabrous. East India; comm. by Walker and Arnott, Sept. 1850. Sandwich Islands, Mrs. Gulick. Hawaiian Islands, Dr. Lyons, 1877 (all as *Glei. dichotoma*).

Var. *emarginata* (Brack.) n. comb., *Mertensia emarginata* Brack. *Glei. emarginata* Moore. Oahu, Sandwich Islands, Dr. Lyons, 1860 (as *Glei. dichotoma*).

Var. *tenera* n. comb., *Gl. dichotoma* var. *tenera*. Comm. ex Herb. Ludg.-Batavo, Java 1864. The segments are comparatively short and broad, the lowest on the upper side of the lowermost accessory pinnae are much larger than the others, broadly ovate, obtuse and crenately lobed toward the base.

*Di. Owhyhensis* (Hook.) C. B. Robinson. Sandwich Islands, Dr. Lyons, (as *Gl. Hawaiensis*).



*Di. pectinata* (Willd.) Undw. Jamaica, G. F. Curtiss and Granada without data (each as *Glei. pectinata*).

# SCHIZAEACEAE:

LOPHIDIUM Rich.

*Lo. elegans* (Vahl.) Presl. Dabadie, Trinidad, Roenysler, Dec. 1889, No. 3949.

SCHIZAEA Sm. Curly Grass.

*S. bifida* Willd. Port Phillip, Australia, C. French, Jr., 1892 and 1894 (two sheets).

*S. dichotoma* (L.) Sm. Sandy scrub, Oakleigh, Victoria, J. H. Morrison, Jan. 25, 1885.

*S. fistulosa* Labil. Port Phillip, Victoria, C. French, Jr., 1890 and 1893 (2 sheets).

*S. pusilla* Ph. New Jersey: Quaker Bridge, S. C. Martindale, Sept. 1877; pine barrens, Atlantic Co., H. R. Bassler No. 3768, August 1879; Egg Harbor, September 6, 1884 (collector not given).

LYGODICTYON J. Sm.

Veins anastomosing.

*L. heterodoxum* (Kze.) J. Sm. Guatemala, Tuerckheim, No. 781 (as *Lygodium heterodoxum* Kze.).

LYGODIUM Swz. Climbing Fern.

Veins not anastomosing.

*L. palmatum* (Bernh.) Swz. Shelburne, Mass., Miss S. E. Anderson.

*L. polymorphum* (Cav.) H. B. K. Bolivia: Guanai, Dr. Rusby No. 144 and Yungas, Bang No. 560. Brazil, Mrs. Webb, No. 264. (All as *L. venustum* Swz.).

Var. *hirsutum* (Willd.) n. comb., *Hydroglossum hirsutum* Willd. Bolivia: Yungas, Rusby No. 143 and Guanai, Bang No. 1349 (both as *L. venustum* Swz.).

Var. *palmatilobum* (Sturm) n. comb., *L. palmatilobum*

Sturm. Guanai, Bolivia, Rusby No. 142 (as *L. venustum* Swz.).

*L. volubile* Swz. var. *acuminatum* (Sturm) n. comb., *L. acuminatum* Sturm. Brazil, Mrs. Webb, No. 262.

Var. *hirtum* (Klf.) n. comb., *L. hirtum* Klf. Brazil, Mrs. Webb No. 263.

Var. *lucens* (Klf.) n. comb., *L. lucens* Klf. Brazil, Mrs. Webb No. 310.

The typical variety of the species has the fertile segments obtuse and the fructifications continuous around the margin.

The var. *acuminatum* has the apex acute and devoid of fructifications.

The var. *hirtum* has the under side of the fertile segment puberulent.

The var. *lucens* has the fertile segments lustrous.

#### ANEMIDICTYON J. Sm.

Veins anastomosing. (See p. 246).

*A. Phyllitidis* (L.) J. Sm. Bolivia: Mapiri, Rusby No. 155 and Guanai, Bang No. 1351.

Var. *Fraxinifolia* (Raddi) n. comb., *Anemia Fraxinifolia* Raddi. This has the terminal pinna more or less decurrent and joined to the pair below it. Brazil, Mrs. Webb Nos. 293 and 332 (as *Ancimia Fraxinifolia* Raddi and *A. Phyllitidis* Swz., respectively).

#### ANEMIA Swartz. (See p. 246).

Veins not anastomosing.

*A. hirsuta* (L.) Swz. Yungas, Bolivia, Bang No. 439 (as *A. tomentosa* Swz. var. ?).

Var. *tenella* (Cav.) Baker. Brazil, Mrs. Webb No. 355 (the species and the variety mixed and as *A. hirsuta* Swz.).

*A. hirta* (L.) Swz. Yungas, Bolivia, Rusby No. 120 (as *A. Breuteliana* Presl.).

*A. oblongifolia* (Cav.) Swz., var. *Presliana* (Prantl) n. comb., *A. Presliana* Prantl. Yungas, Bolivia Bang No. 439 pp. Venezuela, Dr. R. P. Stevens, 1869 as *A. humilis*).

*A. tomentosa* (Savi) Swz. Yungas, Bolivia, Rusby No. 118.

Var. *fulva* (Cav.) Moore. Brazil, Mrs. Webb No. 331.

Var. *oblonga* (Sturm) n. comb., *A. oblonga* Sturm. Brazil, Mrs. Webb No. 254 (as *A. oblonga* Sturm).

Var. *trichorhiza* (Gardn.) n. comb., *A. trichorhiza* Gardn. Yungas, Bolivia: Rusby No. 119 (as *A. trichorhiza*) and Bang No. 438 (as *A. tomentosa* Swz.)

ORNITHOPTERIS Bernh. (See p. 246).

*O. Adiantifolia* (L.) Bernh. Biscayne Bay, Fla., A. H. Curtiss, No. 3770. Havana, Cuba, Mrs. Webb, No. 358, Feb. 1870.

#### OSMUNDACEAE:

LEPTOPTERIS Presl.

*L. superba* (Col.) Presl. Cult. at Green's green houses on Staten Island, July 3, 1880 (as *Todea superba*).

OSMUNDA Linn.

*O. cinnamomea* Linn. Cinnamon Fern. Romulus, Mich., Farwell No. 6163. Richland Co., O., E. Wilkinson, Sept. 4, 1887. Greenwich, N. Y., Dr. Asa Fitch, 1867. Westfield, Mass., Dr. H. H. Rusby, May 26, 1873.

Var. *imbricata* (Kze.) Milde. Eustis, Fla., Nash No. 274.

*O. Claytoniana* Linn. Goodison, Mich., Farwell, No. 6503. Shelburne, Mass., Miss S. E. Anderson (two sheets).

*O. regalis* Linn. var. *spectabilis* (Willd.) A Gr. Flowering Fern. Romulus, Mich., Farwell No. 6164. Michigan, Dr. H. H. Rusby, August, 1884. Shelburne, Mass., Miss S. E. Anderson, June 15, 1873. East Greenwich, N. Y., Dr. Asa Fitch, 1867 (2 sheets). Franklin, N. J., Dr. H. H. Rusby, No. 3772, 1879; also July 1874. Eustis, Fla., Nash No. 305.

Subvar. *anomala* Farw. n. subvar. Some sterile pinnae in the fertile part and some pinnae of the sterile part more or less partly or completely fertile. Wayne, Mich., Farwell and Gladewitz, No. 8670, June 3, 1930.

## SALVINIACEAE:

## AZOLLA Lam.

*A. Caroliniana* Willd. Pointe a la Hache, La., A. B. Langlois, No. 3824. Mexico, Dr. Schaffner, Oct. 1875 [as *A. Mexicana* Schaffner (Fée in litt. 1854) ].

*A. Filiculoides* Lam. Cochabamba, Bolivia, Bang No. 983.

## SALVINIA (Micheli) Adanson.

*S. auriculata* Aubl. Twin Lake, Hennepin Co., Minn. and cult. at the U. of Minn. F. W. Sardeson, Sept. 1889 [as *S. natans* (L.) All.].

*S. natans* (L.) All. In Pechauer See bei Madgeburg, Prussia, Eggertz (without date).

## MARSILEACEAE:

## MARSILEA Linn.

*M. Brownii* A. Br. Central Australia, F. von Mueller (as *M. quadrifolia* Linn.).

*M. macrocarpa* Engelm. San Diego, Tex., Miss Mary B. Croft, 1885.

*M. polycarpa* Hook. San Luis Potosi, Mex., Schaffner No. 15, 1879.

*M. quadrifolia* Linn. Cambridge, Mass., (in Dr. Gray's Garden) L. H. Bailey, Oct. 1883.

*M. vestita* Hk. et Grev. Mouth of the Willamette, Oregon, L. F. Henderson, August 1, 1882. Eustis, Fla., Nash No. 831.

## PILULIFERA Linn.

*P. globulifera* Linn. Mittelfranken, Erlangen, Bavaria, Dr. A. Schwarz, June, 1885.

## MARATTIACEAE:

## MARATTIA Swz.

*M. alata* Swz., var. *laevis* (Sm.) n. comb., *M. laevis* Sm. In this variety the lobes and serrations are obtuse or blunt;

in the typical var. they are acute. Bolivia, Bang No. 2393 (as *M. alata* Sm.).

*M. Douglasii* (Pr.) Baker. Hawaiian Islands, Dr. A. B. Lyons, 1877.

*M. Fraxinea* Sm. India without other data.

*M. Kaulfusii* J. Sm. Brazil, Mrs. Webb No. 304.

#### OPHIOGLOSSACEAE:

OPHIODERMA (Bl.) Endl.

*O. pendulum* (Linn.) Endl. Epiphytic on trees, Hawaiian Islands, Dr. A. B. Lyons, 1877 (as *Ophioglossum pendulum* Linn.).

OPHIOGLOSSUM Linn.

*O. Californicum* Prantl. S. California, D. Cleveland, March, 1882 (as *O. nudicaule*).

*O. Crotalophoroides* Walt. S. Fla., Chapman No. 166 (as *O. nudicaule*).

*O. vulgatum* Linn. Romulus, Mich., Farwell and Glade-witz, No. 8673, June 3, 1930. Willoughby, Vt., H. H. Rusby, August 1, 1892.

Var. *minus* Moore. Shelburne, Mass., Miss S. E. Anderson, July 15, 1873.

BOTRYCHIUM Swz.

*B. dissectum* Spr. Farwell in Michigan as follows: St. Clair Co., No. 6404, September 27, 1922 and No. 6469, Nov. 11, 1922; Disco, No. 7527, August 19, 1925. Alexis, Ohio, Farwell No. 6878, May 7, 1924. Va., L. F. Ward, August, 1886.

Var. *elongatum* (Gilb. and Haber.) Farw. Anchorville and Disco, Mich., Farwell Nos. 6468, Nov. 5, 1922 and 7528,

Aug. 19, 1925 respectively. Alexis, O., Farwell, No. 6879 a, May 7, 1924.

Var. *obliquum* (Muhl.) Clute. St. Clair Co., Mich.: Farwell, No. 6405, September 27, 1922; and Nos. 6470 and 6475, Nov. 5, 1922. Franklin, N. J., H. H. Rusby, Oct. 29, 1877; also 1879.

Var. *tenuifolium* (Underw.) Farw. St. Clair Co., Mich., Farwell, No. 6476, Nov. 5, 1922.

*B. lanceolatum* (Gmel.) Angstr. The illustration of this species in the Journal of Botany Vol. 36, t. 388 fig. C, from a European plant is quite the same as the illustration of D. C. Eaton, Ferns of N. A. Vol. I, t. 5, f. 2 of a N. American plant. The specimen in the P. D. & Co. herbarium from Mass. is so nearly like the illustration in Luerssen's Die Farnpflanzen p. 568 from a European plant that it might have stood as the original from which the drawing had been made; the former represents var. *angusti-segmentum* Pearce and Moore and the latter the typical variety of the species; evidently both forms are common to both continents. The differences between the typical variety and the variety *angustisegmentum*, appear to be much the same as between *B. Lunaria* and its var. *Onondagense*—primarily one of distance between segments; approximate in the species, distant in the variety. My Lake Superior collection No. 588, is like the Massachusetts' specimen. Oakham, Worcester Co., Mass., C. F. Wheeler, July 1883.

*B. multifidum* (Gmel.) Rupr., var. *intermedium* (D.C.E.) Farw. Farwell in Mich. as follows: Kewenaw Co., July 14, 1884; Ortonville, No. 8129, Sept. 21, 1927.

Var. *Oneidense* (Gilb.) Farw. St. Clair Co., Mich., Farwell No. 6477, Nov. 5, 1922.

*B. Matricariaefolium* A. Br., var. *rhombeum* (Angstr.) Farw., *B. neglectum* Wood. Shelburne, Mass., Miss S. E. Anderson, 1876 (as *B. Lunaria* Swz.).

*B. simplex* Hitch., var. *fallax* Milde. *B. tenebrosum* A. A. E. L. M. U. has written on the sheet "*B. umbrosum* A. A. Eaton." New York (without locality) O. E. Pearce, 1885.

Var. *subcompositum* Lasch. Keweenaw Co., Mich., Farwell No. 644, August 8, 1888.

*B. Virginianum* (L.) Swz. Bloomfield, N. J., H. H. Rusby, July 1884.

Var. *gracile* (Ph.) D. C. E. Oxford, Mich., Farwell, No. 6414, October 4, 1922.

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## SOME LACINARIA SPECIES

BENJAMIN FRANKLIN BUSH.

During the two years I was making collections of plants in the Indian Territory, I collected several times what I took to be *Liatris acidota* Engelm & Gray, and put this name on the labels of my specimens.

Some of these specimens have now come into my hands quite unexpectedly, and as soon as I saw them I began to doubt my determinations.

Being curious to know what *L. acidota* really is, and how it differs from *L. punctata*, I got the loan of something over three hundred and sixty sheets of these two species from several large collections for study, and the result of this study has been more surprising to me, than I would have thought before taking it up.

Of the three hundred and sixty odd sheets of *L. acidota* and *L. punctata* examined, I found only five collections of *L. acidota*, out of all those labeled *L. acidota*, one of these from Western Louisiana, which would seem to indicate that this species is very rare or but rarely collected.

I am under many obligations to Dr. C. O. Rosendahl, of the University of Minnesota, Dr. L. H. Pammel, of the Iowa State College, Dr. F. C. Gates, of the Kansas State Agricultural College, Dr. F. V. Coville, of the United States National Museum, Dr. George T. Moore, of the Missouri Botanical Garden and Mr. Albert Ruth, of the Polytechnic, Texas, who have obligingly placed the collections in their care at my disposal, and otherwise assisted me in this study.



1. *LACINARIA PUNCTATA* (Hook) O. K. 1891

Stems stout, stiff, 2-8 dm. high, glabrous, from a stout, deep, woody rootstock. Leaves linear, rigid, erect or ascending, 2-8 mm. wide, 5-10 cm. long, very punctate; spikes usually 2-3 dm. long, and very thick, usually very leafy below, more or less so above; heads 3-6 flowered, 10-16 mm. long, sessile, more or less crowded; involucre bracts oblong, pointed, cuspidate or acuminate, more or less ciliate on the margins, imbricated in 4 or 5 series, densely punctate; flowers reddish-purple; style-branches elongated, twice as long as the pappus, deep rose-color; achenes about 7 mm. long, cylindrical, tapering at the base, strongly ribbed, dark gray in color, scabrous to hirsute; pappus-branches very slender, about 7 mm. long, long-plumose. Dry hills, plains and rocky barrens, Wis. and Minn. to Sask., Mani., Mont., Wyo., Mo., Ia., Colo. and N. Mex.

2. *LACINARIA densispicata* n. sp.

Stems 4-6 dm. high, rather stout, glabrous, from a stout, deep woody rootstock. Leaves very slender, soft, erect or spreading, very punctate, 1-5 mm. wide, 5-10 cm. long, the upper scarcely shorter; spike 2-3 dm. long, very thick and dense, usually long-leafy below, naked above, 2-3 cm. thick; heads 4-8 flowered 12-16 mm. long, sessile, more or less densely crowded; involucre bracts oblong-lanceolate, pointed, densely pubescent on the backs, ciliate on the margins, imbricated in 4 or 5 series, not or faintly punctate; flowers pink or rose-color; style branches elongated, dilated at the ends, pink or rose-color, two or three times as long as the pappus; achenes about 8 mm. long, cylindrical, tapering at the base, blackish, pubescent on the ribs; pappus-branches very slender, about 9 mm. long, long-plumose. On sand dunes and banks.

Bunker Prairie, Anoka County, Minnesota, C. O. Rosendahl 5420, Univ. of Minn., August 20, 1927, sheets Nos. 275143 and 275145, TYPE, as *L. punctata*.

3. *LACINARIA arenicola* n. sp.

Stems 3-4 dm. high, slender, glabrous, many from the crown of a stout, deep, woody rootstock. Leaves linear, soft, erect or ascending, 1-2 mm. wide 5-10 cm. long, strongly punctate, strongly revolute, usually abruptly shortened toward the top of the stem; spikes usually very slender, and much interrupted, nearly leafless, 5-10 cm. long; heads 3-6 flowered, 8-10 mm. long, sessile; involucre bracts oblong, pointed, cuspidate or acuminate, more or less ciliate on the margins, imbricated in 4 or 5 series, faintly punctate, deeply-purple colored; flowers reddish-purple; style-branches elongated, twice as long as the pappus, deep purple; achenes 5-6 mm. long, cylindrical, tapering at the base, ribbed, scabrous on the ribs, dark gray in color; pappus-branches very slender, 6-7 mm. long, long-plumose. Sand dunes on prairies.

Bunker Prairie, Anoka County, Minnesota, *C. O. Rosen-dahl* 5421 b, August 26, 1927, Univ. of Minn., sheets Nos. 275141 and 275144, TYPE, as *L. punctata*; 5421 a, August 26, 1927, sheet No. 275142, as *L. punctata*.

Bluff, Goodhue County, Minnesota, *J. M. Holzinger*, September, 1919, Univ. of Minn., sheet No. 224335, as *L. punctata*.

Mendota, Minnesota, *F. K. Butters*, October 5, 1918, Univ. of Minn., sheet No. 211495, as *L. punctata*.

4. *LACINARIA leptostachya* n. sp.

Stems 4-5 dm. high, glabrous, from a large, shallow tuber, many from a single tuber. Leaves linear, soft, erect or ascending, very punctate, 1-1.5 mm. wide 2.5-5 cm. long, the lower much shorter, the middle ones the longest, the upper gradually reduced to leafy bracts; spikes 1-2.5 dm. long, very slender, about 1 cm. in thickness the whole length, naked above, with very small bractlike leaves below; heads 3-4 flowered, 5-6 mm. long, sessile, more or less crowded; involucre bracts oblong, cuspidate or acuminate, densely pubescent on the backs, more or less ciliate on the margins, imbricated in

4- or 5 series, not punctate; flowers reddish-purple; style branches elongated, twice as long as the pappus, reddish-purple; achenes about 5 mm. long, cylindrical, tapering, at the base, strongly ribbed, dark brown in color, minutely scabrous on the ribs; pappus-branches very slender, about 7 mm. long, tawny, long-plumose. Rocky ground and barrens.

Tarrant County, Texas, A. Ruth 24, June 10, 1923, I. S. College, sheet No. 113819, TYPE, as *L. acidota*.

I refer here also the following:

Comanche Spring, Texas, F. Lindheimer 941, month not given, 1849, Mo. Bot. Garden, sheet No. 126639, as *L. acidota mucronata*.

#### 5. *LACINARIA angustifolia* n. sp.

Stems 4-5 dm. high, slender, from a small coated tuber, glabrous. Leaves linear, soft, spreading or ascending, 1-2 mm. wide, 1-5 cm. long, the upper not reduced in length, the lower ones long and thread-like, punctate; spike 5-10 cm. long, 1-2 cm. thick, leafless, rather loosely flowered; heads 3-6 flowered, 8-10 mm. long, sessile, somewhat crowded; involueral bracts ovate-lanceolate, pointed or cuspidate, densely pubescent on the backs, ciliate on the margins, imbricated in 5 or 6 series, not punctate; flowers pink or rose-color; style-branches elongated, two or three times as long as the pappus, pink or rose-color; achenes about 7 mm. long, cylindrical, tapering at the base, ribbed, dark gray in color, minutely scabrous on the ribs; pappus-branches very slender, about 7 mm. long, tawny, long-plumose. Rocky prairies and barrens.

Cultivated specimen in green house from seed from Texas plants, TYPE, type locality unknown, sheet No. 211347, Univ. of Minn., as *L. punctata*.

I refer here also as follows:

Comanche Spring, Texas, F. Lindheimer 170, month not given, 1849, K. S. A. College, with no specific name.

Neubraunfels, Texas, F. Lindheimer 468, month not given, 1850, K. S. A. College, as *L. mucronata*.

Tarrant County, Texas, *A. Ruth* 78, September 5, 1922, K. S. A. College, sheet No. 67521, as *L. acidota*.

Weatherford, Texas, *S. M. Tracy* 8143, October 18, 1902, Univ. of Minn., sheet No. 211349, as *L. acidota*.

Houston, Texas, *Geo. L. Fischer*, October 9, 1918, Mo. Bot. Garden, sheet No. 867269, as *L. acidota*.

Half Moon Mountains, Gillespie County, Texas, *G. Jermey*, date not given, Mo. Bot. Garden, sheet No. 126649, as *L. acidota*.

Big Spring, Texas, *S. M. Tracy* 8153, October 13, 1902, Mo. Bot. Garden, sheets Nos. 126644 and 126649, as *L. acidota*.

Comanche Spring, Texas, *F. Lindheimer* 940 and 941, month not given 1849, Mo. Bot. Garden, sheets Nos. 126641 and 126639, as *L. acidota*

Tarrant County, Texas, *A. Ruth* 78, September 5, 1912, Ruth Herb., as *L. acidota*; September 2, 1928, Ruth Herb. as *L. acidota*.

Fort Worth, Tarrant County, *A. Ruth*, October 7, 1910, Ruth Herb., as *L. acidota*.

McAlester, Choctaw Nation, Indian Territory, *C. S. Sheldon* 293, August 19, 1891, Univ. of Minn., sheet No. 211346, as *L. acidota*; Mo. Bot. Garden, sheet No. 126637, as *L. acidota*.

This is the species, I have no doubt, that has been the basis of Missouri, Kansas, Oklahoma and Arkansas being cited as part of the range of *L. acidota*, which species has not been seen by me from these States.

#### 6. *LACINARIA Ruthii* n. sp.

Stems numerous from a large coated shallow bulb, 3-4 dm. high, stout, glabrous. Leaves linear-oblong, soft, spreading at right angles to the stem, 2-4 mm. wide 2.5-4 cm. long, flat, densely minutely punctate, acute at the apex, longest in the middle of the stem, gradually shortened toward the base and the upper part of the stem; spike very thick and dense, 7-12 cm. long, 2.5-3 cm. thick, densely flowered, almost naked; heads 4-6 flowered, 8-12 mm. long, sessile, more or less

crowded; involucre bracts oblong, cuspidate or pointed, slightly ciliate on the margins, glabrous, imbricated in 5 or 6 series, not punctate; flowers pink or rose-color; style-branches elongated, two or three times as long as the pappus, pink or rose-color; achenes about 6 mm. long, cylindrical, tapering at the base, strongly ribbed, nearly black in color, minutely pubescent on the ribs; pappus-branches very slender, about 7 mm. long, long-pulmose. Rocky hillsides and barens.

Polytechnic, Tarrant County, Texas, A. Ruth 78, September 5, 1912, Univ. of Minn., sheet No. 211348, TYPE, as *L. acidota*.

I refer here also the following:

Tarrant County, Texas, A. Ruth 78, September 15, 1912, Mo. Bot. Garden, sheet No. 709944, as *L. acidota*.

#### 7. *LACINARIA brachyphylla* n. sp.

Stems very slender, 6-9 dm. high, from a shallow woody rootstock. Leaves very numerous, linear, flat, epunctate, 1-3 mm. wide, 2-4 cm. long, gradually shortened toward the upper part of the stem, the lower ones spreading, the upper ones ascending or erect; spikes very slender, dense, 2-3 dm. long, and 1 cm. thick, more than one-half of it furnished with numerous bract-like leaves, 1-2 cm. long; heads 3-6 flowered, 6-8 mm. long, sessile, more or less crowded; involucre bracts lanceolate, acute, or acuminate, epunctate, imbricated in 3 or 4 series; flowers red or pink; style-branches elongated, twice as long as the pappus, deep pink or red; achenes about 4 mm. long, strongly ribbed, cylindrical, tapering at the base, dark brown in color, minutely scabrous; pappus-branches very slender, about 6 mm. long, short-plumose. Prairies and plains.

Eagle Lake, Colorado County, Texas, E. J. Palmer 6578 September 18, 1914, Mo. Bot. Garden, sheet no. 754577, TYPE, as *L. acidota*.

8. *LACINARIA ACIDOTA* (Engelm. & Gray) O. K. 1891.

Stems 3-9 dm. high, extremely slender, glabrous, from a shallow coated tuber. Leaves linear, elongated, 1-1.5 dm. long, 3-4 mm. wide, the lower ones 2-4 dm. long and 4-6 mm. wide, the upper half of the stems with very short, appressed bract-like leaves, all epunctate, involute, and with revolute margins; spikes very loose and slender, 5-10 cm. long, leafless; heads 3-5 flowered, 5-6 mm. long, sessile; involucre bracts oblong, acute, glabrous, epunctate, imbricated in 3 or 4 series; flowers rose-colored or pink; style-branches elongated, about twice as long as the pappus, pink or rose-colored; achenes about 4 mm. long, cylindrical, tapering at the base, strongly ribbed, minutely scabrous on the ribs, dark brown in color; pappus-branches about 6 mm. long, short-plumose. Prairies and plains.

Texas and Western Louisiana.

Kirbyville, Texas, *E. R. H.*, November 27, 1902, I. S. College, sheet No. 33506, as *L. acidota*.

Locality not given, Texas, *J. Reverchon* 410, date not given, Mo. Bot. Garden, sheet No. 126638, as *L. acidota*.

Evergreen, Texas, *J. F. Joor*, July 29, 1884, Mo. Bot. Garden, sheet No. 126648, as *L. acidota*.

Seabrook, Texas, *Geo. L. Fisher*, August 11, 1913, Univ. of Minn., sheet No. 249386, as *L. acidota*.

Lake Charles, Louisiana, *K. K. Mackenzie* 475, August 25 to September 10, 1898, K. S. A. College, as *L. acidota*; Mo. Bot. Garden, sheet No. 126646, as *L. acidota*.

## BOOK REVIEWS

ENVIRONMENT AND LIFE, by A. S. Pearse. Charles C. Thomas, 1930. xi+105 pp. \$2.00.

"An Animal," says Dr. Pearse, "is a coördinated, individualized system of activities which is taking place in a particular mass of matter." This systematic series of activities must continue if the animal is to exist; must continue normally if it is to exist in a state of health; and must meet certain changing environmental situations if it is to insure the continuance of the race. The complexity of the organism determines, in a large measure, the complexity of the processes which it must maintain and the flexibility with which they must function. From the metabolic adjustments of *Cliona* to the psychologic ones of *Pan*, however, environment remains the controlling factor, and existence must be interpreted as response or adaptation to environment.

This, I suspect, is the central thesis of Dr. Pearse's latest book. It is a volume which, unlike most discussions of ecology, attracts the reader rather than repels him. Thus it successfully presents many of those elementary facts about the relationships of organisms to their environments, which most of us know, few of us reflect upon, and almost no one attempts to place before the non-technical or student reader. To which of these (if either) the book is addressed is not clear; so far as can be told from one reading, it will serve both equally well.

One of the outstanding merits of the book is its strict impartiality; its complete freedom from decisions on matters that have not, and perhaps cannot be decided. "Science," says Dr. Pearse, "does nothing but weigh and measure. A scientist's day is usually taken up with tiresome determinations of how much, how far, how many, and how fast." So is this book: though one cannot agree that the determinations presented in it are tiresome. That, at

least, the popularizer has a full right to delete. Dr. Pearse's book is popularization of an order that we do not find too abundantly in American publications.

This appears especially in his treatment of adaptation (pp. 3-6), in his classification of animal habitats (pp. 15-33), and in the chapter on Environment and Evolution (pp. 47-61). Adaptation probably has offered a greater field for unwarranted speculation, for teleologic hypothesis, and for anatomical romance, than has any other one field of biology. Yet it simmers down to one essential fact: that organisms are fitted to live, generally in a limited environment, by the performance of a limited series of functions. That fitness, of itself, is no more miraculous than is the fitness of water for the formation of solutions. As HENDERSON showed nearly two decades ago, we are not apt to understand the fitness of cells until we understand that of water and carbon dioxide. He wrote a remarkably readable book substantiating his position—yet the *Fitness of Environment* seems to be infrequently read. If its thesis has found its way into any non-technical volumes other than the one under review, I have failed to encounter them.

The relationship of environment to evolution has been another field of unwarranted speculation. The public in general lives in the period of the natural philosophers, so far as this subject is concerned, and attributes to the environment the same marvellous powers assigned it in 1660. Paleontologists are more critical, yet many of them make a stand which is pure Buffonism, or Buffonism tinged with the Lamarckian "will to change." Many zoologists go to the other extreme, as also do some botanists: *vide* the recent assertion by FISHER that even experimental factors fail to indicate the causes of mutations. Dr. Pearse summarizes the situation, expresses a reasonable skepticism as to the evidence so far produced in support of the idea that the environment does cause evolutionary change, and concentrates upon the undeniable relationships which exist



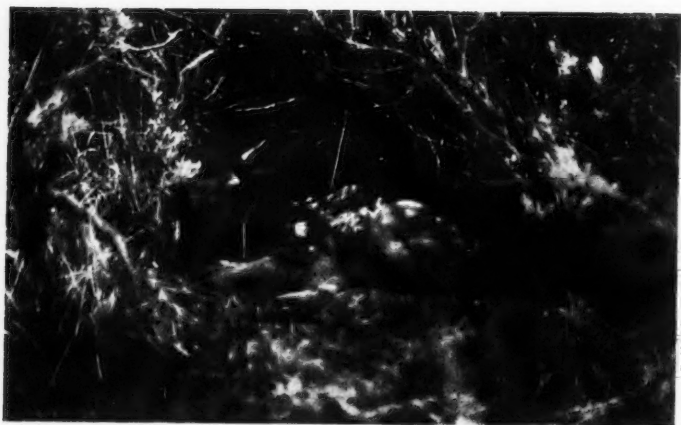
and have existed between shifting environments and modifications once established.

There are many other points on which comment might be made, but the reader will do well to turn to Pearse himself. There he will find concise statements by an author who knows how to make one word do the work of two, and whose work might therefore serve as a model in scientific style as well as thought. *Environment and Life* is a useful summary, an adventure in reading, and an attractive, well-printed little volume.—Carroll Lane Fenton.

ANIMAL LIFE OF YELLOWSTONE NATIONAL PARK,  
by Vernon Bailey. Charles C. Thomas. 241 pp.  
\$4.00.

There are several viewpoints from which this admirably illustrated account of the birds and mammals of our most famous national park might be reviewed. Were the month December, and the journal one with a wider popular appeal, I should be inclined to stress its merits as a gift volume. Mr. Thomas is a publisher who believes that books on technical zoology as well as natural history merit good paper, tasteful printing, and attractive covers. Doubtless these add to the cost of the volumes published; but to a reviewer whose library consists very largely of the none too attractive bulletins of state and national geological surveys, not to mention textbooks produced by printers who are economical of ink, a book bearing the Thomas imprint always is welcome. This one especially so, for the buff paper forms a pleasing background for the numerous half-tones, and the impressed design of the cover has exceptional merit. Here, certainly, is a book which will have a prominent place on my shelves whenever I anticipate calls from certain friends who discuss "fine editions," with an eye to my dog-earned file of *Farmer's Bulletins* and reprints.

*Animal Life of Yellowstone National Park*, therefore, is a thing of beauty—and will be a joy until someone borrows



Above: An elk calf about two days old, showing relationship of spots to normal high-lights of vegetation. Below, a photograph of elk trailing through deep snow in spring—an example of ecologic relationships which complicate conservation. Both from Bailey, *Animal Life of Yellowstone National Park*.

it without my permission and then leaves the city. It also is a source of considerable information concerning one of my hobbies: the conservation and development of our mammalian fauna. In discussing the bison, the elk, and other big game mammals, Mr. Bailey gives information as to their numbers within the park during several decades, climatic and other factors associated with fluctuations in those numbers, the apparent influence of predatory animals (especially wolves and coyotes), and the ability of the existing range to support further increase. He shows, for example, that the bison herds are beyond all need for serious concern: even the "wild" or mountain herd has risen from twenty-five individuals, in 1901, to one hundred twenty-five in 1927. Clinging steadfastly to a range on the high plateaus, from eight thousand to eight thousand five hundred feet in elevation, they meet environmental conditions more rigorous than those confronted by the mountain sheep, which retire to lower lands for winter forage. Yet they survive and prosper, furnishing our most striking exception to the popularly held belief that the bison is purely an animal of the plains and valleys.

Whether or not these mountain bison are specifically different from the bison of the plains (*B. bison bison*), imported from Montana and northern Texas to form the Lamar River herd, Mr. Bailey does not determine. In spite of conflicting reports, it seems that there is at least one typically alpine bison, with a larger skull and stouter, longer and more spreading horns than those of its prairie relative. Another, or perhaps a variant of the same animal, was reported by Brewer, in 1871, from altitudes of eleven thousand feet, in Colorado, as "smaller, longer-haired, shaggier, and blacker than the plains animals." Now that the creatures are beyond danger of extinction, someone should unravel the confused taxonomy of *Bison* in America, and if possible, contribute information as to distribution.

Other large game animals have fared less well than has the bison. Elk, deer, antelope and moose show serious

decreases in numbers, and illustrate the difficulties encountered when non-protected state areas adjoin extensive game preserves. They also show, apparently beyond question, a fact that I (for one) have found a bit hard to accept: that the coyote is a serious menace to large artiodactyls. My own acquaintance with the coyote was made on the plains of Saskatchewan, and it has given me a sincere liking for the animal, no matter what his failings are. True, zoologists have written caustic accounts of the cowardliness of the southern coyote, his sneaking ways, and often dirty habits. But the coyotes of Saskatchewan twenty years ago were neither little, cowards nor sneaks. In size they approached smaller wolves; they walked nonchalantly into barnyards in broad day; they would make sport of the average farm dog and retire only if the farmer brought forth a gun; and they were not, so far as I could find, guilty of most of the offences laid at their door. Calves they rarely killed; poultry was molested only occasionally—chiefly in the years of scarcity of hares, which furnished their chief supply of food. So far as I am concerned, one coyote is more enjoyable as an animal than are a dozen dogs, and I'm genuinely sorry that his habits, at least in the Yellowstone region, are what Mr. Bailey shows them to be.

It is plain, however, that Mr. Bailey does not favor a promiscuous slaughter of predatory animals. The cougar, lynx, wolf and even the coyote have their place as members of the mountain fauna; and even though the first of these is so secretive in habits as to "add little interest to the animal life of the park" it still would be unfortunate for it to disappear entirely. Humanity is so constructed that it always paints carnivores as the dark villains in nature's plot, and herbivores as the mistreated heroines, but the picture is not scientifically sound. The problem is not one of judging innocence and guilt, but of determining a balance which will offset the predatory habits of man himself, and the damage which he does to herbivores, even in a national park. The pronghorn is scarce, not because of

coyotes, but because of men. Even if it is inevitable that the four-footed carnivore should make most of the compensation in our scheme of conservation, we at least may refrain from rendering moral judgement against him.

The field of conservation, therefore, is concerned with three important groups of animals: men, herbivores, and carnivores, and with their relationships to the geological, the botanical and the legal environment. On the side of mammalogy *per se* treatment is not thus limited, and laws (or lack of them) especially may be disregarded. Complex environmental relationships remain, and they appear again and again in the discussions of rodents, insectivores and carnivores which do not enter directly into the problem of conservation. One wishes that space had permitted further discussion of ecologic relationships of mammals with plant communities, with rock types, and with each other. Ecology has been called scientific natural history; at least, there can be no doubt that natural history (not always scientific) is the parent of this relatively recent sub-science of biology. In view of the youth of the offspring, one perhaps should be grateful for its progress as a whole, but it has not yet made much impression on the readable volumes of natural history. When it does so, natural history will be more illuminating than it generally is, and will touch fundamentals more often than it does today.

For obvious reasons—the most obvious being Mrs. Bailey's admirable *Handbook*—birds are given less attention in this volume than are the mammals. There is a summary and list, with accounts of the habits and distribution of some of the more important and striking species. Since the visitor who wishes to identify birds in the park undoubtedly will provide himself with a suitable manual, this does not detract from the value of the present volume.

Treatment of the cold-blooded vertebrates and the invertebrates is very brief. Two pages are allowed for the former; one only is given to the several non-chordate phyla which are represented in the park. In a technical treatise

such treatment would be unreasonable—as unreasonable as the allotment of space to vertebrates and “invertebrates” in most textbooks of zoology. But this is neither a textbook nor a treatise; it is the sort of book in which one understands “animal” to mean vertebrate, or even mammal, so that the discrepancy is not serious. Yet I, for one, would have welcomed more information about the five reptiles and five amphibians which inhabit the park, and about the importance of the “non-food” fishes in the menus of the various water birds. Doubtless some of the information is not available; doubtless, also, a treatment of the invertebrates comparable to that given the mammals is out of the question. Yet one closes the book with the hope that the future will produce a companion volume dealing with the more significant invertebrates, especially in their relationships to other animals and to plants.—Carroll Lane Fenton.

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